

Document of  
The World Bank

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Report No: 37877-IN

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF US\$335 MILLION

AND

PROPOSED CREDIT

IN THE AMOUNT OF SDR 99.8 MILLION  
(US\$150 MILLION EQUIVALENT)

TO

GOVERNMENT OF INDIA

FOR A

TAMIL NADU IRRIGATED AGRICULTURE MODERNIZATION AND WATER RESOURCES  
MANAGEMENT PROJECT

DECEMBER 21, 2006

Sustainable Development Department  
South Asia Region

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## CURRENCY EQUIVALENTS

(Exchange Rate Effective November 30, 2006)

Currency Unit	=	Indian Rupee (Rs.)
Rs. 44.59	=	US\$1
US\$ 1.50435	=	SDR 1

## FISCAL YEAR

April 1 – March 31

## ABBREVIATIONS AND ACRONYMS

ABDF	Agri-Business Development Facility	MDPU	Multi-Disciplinary Project Unit (coordinating unit for the IAMWARM project)
ATMA	Agricultural Technology Management Agency	NGO	Non-Governmental Organization
BCM	Billion Cubic Meters (Km <sup>3</sup> )	O&M	Operations and Maintenance
C&AG	Comptroller and Auditor General	PIM	Participatory Irrigation Management
CSO	Civil Society Organization	PWD	Public Works Department
CWUA	Cluster Water User Association	R&D	Research and Development
ESA	Environmental and Social Assessment	SEMF	Social and Environment and Social Management Framework
GIS	Geographic Information Systems	SRI	System of Rice Intensification (also known as the Madagascar Technique)
GoI	Government of India	SWaRMA	State Water Resources Management Agency
GoTN	Government of Tamil Nadu	TNAU	Tamil Nadu Agricultural University
HACCP	Hazard Analysis and Critical Control Point	WAN	Wide Area Network
IAMWARM	Irrigated Agriculture Modernization and Water-bodies Restoration and Management	WOP	WithOut Project
IASB	Internal Audit and Statutory Board	WP	With Project
ICR	Implementation Completion Report	WRCP	Water Resources Consolidation Project (recently-completed Tamil Nadu IDA project)
IMS	Information Management System	WRO	Water Resources Organization
IPM	Integrated Pest Management	WRRF	Water Resources Research Fund
IPNM	Integrated Plant Nutrient Management	WUA	Water User Association
IRF	Irrigation Research Fund		
IWS	Institute for Water Studies		
LAN	Local Area Network		
M&E	Monitoring & Evaluation		

Vice President:	Praful C. Patel
Acting Country Director:	Fayez S. Omar
Sector Manager:	Gajanand Pathmanathan
Task Team Leader:	Srinivasan Raj Rajagopal

**INDIA**  
**Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project**

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**MAPS:**

IBRD No. 35208

IBRD No. 35209

**INDIA**

**TAMIL NADU IRRIGATED AGRICULTURE MODERNIZATION AND WATER-BODIES  
RESTORATION AND MANAGEMENT PROJECT**

**PROJECT APPRAISAL DOCUMENT**

SOUTH ASIA

SASSD

<p><b>Date:</b> December 21, 2006</p> <p><b>Senior Manager, India Program and Acting Country Director, India:</b> Fayez S. Omar</p> <p><b>Sector Manager/Director:</b> Gajanand Pathmanathan/ Constance Bernard</p> <p><b>Project ID:</b> P090768</p> <p><b>Lending Instrument:</b> Specific Investment Loan (SIL)</p>	<p><b>Team Leader:</b> Srinivasan Raj Rajagopal</p> <p><b>Sectors:</b> Irrigation and drainage (70%); Crops (15%); Sub-national government administration (8%) General water, sanitation and flood protection sector (5%); Animal Production (2%)</p> <p><b>Themes:</b> Rural services and infrastructure (P); Water resource management (S)</p> <p><b>Environmental screening category:</b> (A) Full Assessment</p>
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Project Financing Data			
<input checked="" type="checkbox"/> Loan <input checked="" type="checkbox"/> Credit <input type="checkbox"/> Grant <input type="checkbox"/> Guarantee <input type="checkbox"/> Other:			
For Loans/Credits/Others: Total Bank financing (US\$m.): US\$485.00 million equivalent Proposed terms: Variable Spread Loan			
Financing Plan (US\$m)			
Source	Local	Foreign	Total
IBRD	285.00	50.00	335.00
IDA	150.00	0.00	150.00
Government of Tamil Nadu	56.00	0.00	56.00
Farmers Share of Drip/Sprinkler/Other Equipment	25.00	0.00	25.00
<b>Total:</b>	<b>516.00</b>	<b>50.00</b>	<b>566.00</b>
<p><b>Borrower:</b> Government of India (GOI)</p> <p><b>Responsible Agency:</b> MDPU through Water Resources Organization, Public Works Department (WRO-PWD), and Government of Tamil Nadu (GoTN)</p>			

Estimated disbursements (Bank FY/US\$m)									
FY	07	08	09	10	11	12	13	14	
Annual	5	70	90	100	100	70	45	5	
Cumulative	5	75	165	265	365	435	480	485	
Project implementation period: Start: April 1, 2007					End: March 31, 2013				
Expected effectiveness date: March 1, 2007									
Expected closing date: March 31, 2013									

Does the project depart from the CAS in content or other significant respects? <i>Ref. PAD A.3</i>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Does the project require any exceptions from Bank policies? <i>Ref. PAD D.7</i>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Have these been approved by Bank management?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Is approval for any policy exception sought from the Board?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Does the project include any critical risks rated “substantial” or “high”? <i>Ref. PAD C.5</i>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Does the project meet the Regional criteria for readiness for implementation? <i>Ref. PAD D.7</i>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

<b>Project development objective</b> <i>Ref. PAD B.2, Technical Annex 3</i>	
The proposed project development objective is for selected sub-basin stakeholders to increase irrigated agriculture productivity in a sustainable water resources management framework.	
<b>Project description</b> <i>[one-sentence summary of each component] Ref. PAD B.3.a, Technical Annex 4</i>	
The project objective is proposed to be achieved through the following components:	
<b>Component A: Irrigation systems modernization in a sub-basin framework (Base Cost US\$ 282.83 million)</b>	
This component seeks to improve bulk water delivery to irrigation systems through modernization of irrigation systems and service delivery and management in schemes in about 63 selected project sub-basins. The two sub-components for this component include A1: Tank systems, and A2: Other irrigation systems	
<b>Component B. Agricultural Intensification and Diversification (Base Cost US\$ 16 6.23 million)</b>	
This component seeks to build on the improved bulk water delivery of the previous component to increase the productivity of agriculture-related activities through improved agricultural intensification and diversification in about 63 selected sub-basins. This will include work on sub-components B1: Tank systems, and B2: Other irrigation systems.	
<b>Component C. Institutional Modernization for Irrigated Agriculture (Base Cost US\$ 52.69 million)</b>	
This component seeks to improve the institutional capacity for modern, efficient, and accountable irrigation service delivery. The scope of this activity is state-wide.	
<b>Component D: Water Resources Management (Base Cost US\$ 5.00 million)</b>	
The objective of this component is to improve the institutional arrangements and capacity for sustainable water resources management in the State.	
<b>Component E. Project Management Support (Base Cost US\$ 8.32 million)</b>	
This component will support the management and coordination efforts related to this project.	
<b>Which safeguard policies are triggered, if any? Ref. PAD D.6, Technical Annex 10</b>	
Environmental Assessment (OB/BP 4.01)	
Pest Management (OP 4.09)	
Cultural Property (OPN 11.03, being revised as OP 4.11)	
Involuntary Resettlement (OP/BP 4.12)	
Safety of Dams (OP/BP 4.37)	

Significant, non-standard conditions, **if any**, for:  
*Ref. PAD C.7*  
Board presentation: None.  
Loan/credit effectiveness: None

Covenants applicable to project implementation:

Tamil Nadu shall:

- a) at all times maintain, in a manner satisfactory to the Association and the Bank, the MDPU headed by a Project Director, who shall be a civil servant with experience in coordination of and working in multiple departments, who shall be assisted by competent staff in adequate numbers and with adequate resources.
- b) by December 31, 2007, establish the SWaRMA as the state -wide focal agency for environmentally and socially sustainable inter-sectoral water resource management;
- c) at all times during the implementation of the Project: (a) maintain the WRO and strengthen its operational capacity as a specialized irrigation service delivery department; (b ) maintain the PSC and the WUAs in the Project Area; (c) maintain the MDPU, the SWaRMA, and the cells established within the implementation agencies, all under the supervision of qualified and experienced management assisted by competent staff in adequate numbers and with adequate resources satisfactory to the Association and the Bank.
- d) cause the MDPU to furnish to the Association and the Bank for their review and approval, by November 15 of each year until completion of the Project, commencing on November 15, 2007, the Sub-basin Development Plans prepared by the agencies involved in the implementation of the Project, together with the Annual Work Programs and budget estimates in connection with the following year, and proceed thereafter to coordinate the carrying out of the said Annual Work Programs taking into account the Association's and the Bank's comments thereon.
- e) carry out the Project in accordance with the Operations Manual, the ESA, the ESMF, the Transparency and Accountability Plan and the Annual Work Programs, and shall not amend or waive any provision of the Operations Manual, the ESA, the ESMF, the Transparency and Accountability Plan and any of the Annual Work Program, except as the Association or the Bank shall otherwise agree
- f) within three (3) years of the Effective Date, take all necessary action required on its part to establish a required number of WUAs in all of the sub-basins in the Project Area;
- g) within ninety (90) days of the Effective Date, place in position an executive engineer for each sub-basin or cluster of sub-basins in the Project Area, with reasonable tenure to ensure effective Project implementation, to act as nodal officer for the development and implementation of Sub-basin Development Plans, and to ensure, within each sub-basin, that a sub-basin development unit has been established with appropriate staffing and resources to prepare and implement Sub-basin Development Plans;
- h) ensure that the installation and testing of computer equipment and communications infrastructure in WRO's offices shall take place not later than December 31, 2008.
- i) take all necessary measures required on its part to establish by December 31, 2007, and thereafter maintain, in a manner satisfactory to the Association and the Bank, a funding mechanism to provide Grants from the Irrigation Research Fund to Grant Recipients for applied research in improved irrigation technologies.
- j) ensure that, within two (2) weeks from receiving a funding request from WRO in connection with the financing of any given Annual Work Program, the Project Implementing Entity's Finance Department shall arrange for the issuance of a letter of credit in an amount sufficient to cover WRO's semi -annual requirements to finance Project activities covered under the Annual Work Program.
- k) within ninety (90) days of the Effective Date, take all necessary action required on its part to employ consultants, in accordance with the provisions of Part C of Section III of Schedule 2 to the Financing Agreement, to undertake monitoring and evaluation activities under the Project;
- l) within six (6) months of the Effective Date, place in position a suitable internal auditor, pursuant to terms of reference acceptable to the Association and the Bank; and
- m) within thirty (30) days of the Effective Date, establish, and thereafter maintain, with experienced staff in adequate numbers and sufficient resources: (i) a participatory irrigation management cell whose main responsibility shall be to strengthen the institutional capacity of the WUAs, and strengthen the capacity of the WRO to provide services to farmers; (ii) an information technology cell whose main responsibility shall be to oversee the implementation of computerization and connectivity activities, and facilitate the functioning of a web-based information management system; and (iii) a training cell whose main responsibility shall be to coordinate training activities on the basis of an annual training plan prepared by the training cell in consultation with the MDPU and the WRO.

## **A. STRATEGIC CONTEXT AND RATIONALE**

### **1. Country and sector issues**

#### **Background:**

1. Tamil Nadu is home to about 62 million people living in 17 river basins (see Map 1 at the end of this document). Many of these basins are water stressed, as supplies are limited and increasingly polluted and competing demands are growing. About 61 major reservoirs, 40,000 tanks (traditional water bodies that are central to the state's water and irrigation systems) and 3 million wells help irrigate over 2 million hectares (out of 5.5 m ha of cropland), supply water to an increasingly urbanized and industrialized population, and attempt to meet other demands such as hydropower, fisheries, environmental flows and community uses.
2. Agriculture is responsible for less than 16% of the Gross State Domestic Product (GSDP); but is responsible for half the household income for the more than half the state's population that live in rural areas. About 20-30% of the rural population is classified poor (primarily agricultural labor) and is heavily dependent on agricultural wages. The agricultural sector faces major constraints due to poor quality irrigation infrastructure, water scarcity, groundwater overdraft, and pollution of surface and ground waters.
3. The irrigation infrastructure that is the backbone of the irrigated areas is in considerable need of modernization and a new paradigm for operations and maintenance. This includes rehabilitation of irrigation canal systems at all levels, restoration and revival of tanks, improving the flexibility of systems to deliver water as required for different crops, introduction of measurement devices, promotion of piped, drip, and sprinkler systems, and automated information systems and control where appropriate. This needs to not only be accompanied by capacity-building of irrigation-related institutions (government and water user associations), but also be accompanied by associated meaningful investments in the water value chain.
4. The institutional framework for irrigated agriculture needs to be strengthened to improve irrigation service delivery efficiency and accountability. This includes modernization of the government agencies (including office infrastructure, training, information systems, etc.) associated with irrigation and drainage, as well as the water user associations that have been set up in many parts of the state and need to be scaled up in coverage and function.
5. Improved performance in agriculture and related areas can be the key to unlocking the tremendous potential of Tamil Nadu's rural areas. This can result primarily from improving the productivity of water in irrigated agriculture, which would require investments and capacity-building to improve water delivery and use efficiency, intensification, diversification into higher-value, less-water intensive crops such as spices, fruits, and vegetables, agro-processing and value-addition, improved marketing and access, and improvement in other farm activities that depend on water (e.g. fisheries, livestock management). An appropriate combination of modern tools, techniques, and implements, as well as growth in labor-intensive agriculture could yield improved farmer incomes and products to fuel economic growth, while creation of employment opportunities in on- and off-farm activities could further reduce rural poverty.

6. There have been a number of institutions involved with the various activities outlined above. The problem lies in the fact that there needs to be better mechanisms for these institutions (related to irrigation, agriculture, agricultural engineering, horticulture, animal husbandry, fisheries, agricultural universities, water user associations, etc.) to work together in a much more coordinated manner to achieve and sustain this productivity improvement that is translated to increased farmer incomes. In addition, the activities need to be considered in a basin/sub-basin framework to reduce overlap, increase impact, and ensure adequacy of the resource base. Most of all, avenues need to be found to upscale the activities that have been undertaken in small demonstrations or pilots that can then provide the economies of scale for a transformational change in the State's economy and poverty alleviation efforts.
7. The State is also one of the most water-stressed in India and there is a strong need to strengthen its institutional capacity to better manage its scarce catchment, river, and ground water resources, of which agriculture is the largest user. The ability to better manage basin waters and plan future investments with adequate stakeholder involvement and analytical rigor needs to be considerably strengthened to ensure sustainability of the resource base and a shared vision of the basin across multiple stakeholders. There is also a need to improve the knowledge base, analytical capacity, and targeted multi-disciplinary research to address important knowledge gaps on issues and options for sustainable water resources management.
8. **Government Actions:** The Government of Tamil Nadu (GoTN) has taken a number of progressive actions on irrigated agriculture and water resources management, supported by the Bank-assisted Tamil Nadu Water Resources Consolidation Project (WRCP), which closed in September 2004 with a satisfactory rating. Some of these actions taken include:
  - Modernizing Irrigated Agriculture: The state piloted a multi-disciplinary approach to work in an integrated manner in modernizing irrigated agriculture over a demonstration area of about 3000 ha in the Hanuman Nadhi sub-basin of the Thambiraparani system (system tank improvement, drip and sprinkler irrigation, introduction of tissue culture for banana,). This approach fostered engineer-extensionist-farmer linkages and helped agencies to work together. The ICR mission for the WRCP project has reported that there is a perceptible change in mind-set of officers and farmers who participated in this exercise. Demonstrations in this exercise were focused on crop diversification to high value crops.
  - Institutional: Strengthening of the Institute for Water Studies and the State Surface and Groundwater Data Center and preparation of detailed spatial knowledge base for water management; creation of a multi-sectoral Water Resources Control and Review Council (WRCRC) chaired by the Chief Minister with seven thematic sub-committees which is a precursor for unbundling resource management from service delivery; creation of operational environmental cells in WRO; decentralization of operational Chief Engineers in a basin/cluster of basins framework; and formation of water users associations.
  - Policy and Strategy: TN was one of the first Indian states to pass a Groundwater Bill, Transparency in Procurement Act and a Farmers Management of Irrigation Systems Act. The state has prepared a State Framework Water Resources Plan for all the river basins except Cauvery, an Environmental Planning Framework for Water Resources Management, and a State Water Policy,
  - Water Resources Management: Comprehensive water planning on a river basin basis with micro-level plans having been completed for five basins and work is under way for another eleven basins, First two representative River Basin Boards formed in the South Asia Region (Palar and Thambiraparani Basin Development and Management Boards), development of a good database for all river basins and enhanced analytical capacity for water planning at the Institute of Water Studies.

9. **Emerging Issues:** The actions outlined above go a long way in laying the foundation to manage the needs outlined earlier to move towards more efficient irrigation service delivery and improved resource management. However there are still a few key issues that need to be addressed:
- Institutional challenges which continue to constrain optimum management and development of water resources in the state need to be addressed. This includes institutional separation of responsibilities for water resource management and irrigation service delivery, need for mechanisms for better allocation of water across sectors, examining the lessons learned in the Palar and Thambiraparani Basin Boards already set up and suitably expanding to other basins/sub-basins, and modernizing the irrigation service delivery institutions (both at the government and water user level).
  - Operation and maintenance of irrigation assets needs greater focus through better asset management systems, adequate budget allocation, improved collection, and strengthening water user associations to take on increasing maintenance responsibility.
  - Participatory irrigation management has to be strengthened and rolled out state -wide to improve farmer involvement in irrigated agriculture decision-making and serve as an organizing principle for extension, marketing, and dialogue.
  - Agricultural diversification and marketing has to be promoted to increase the productivity of water.
  - Greater attention is needed for modernizing irrigation infrastructure and scaling-up the adoption of efficient and water-saving irrigation technologies.
  - Better mainstreaming of social and environmental issues in irrigation service delivery and water resources management is required.
  - Improved mechanisms are necessary to systematically design investments with stakeholder involvement and a “shared vision” across agencies, and to appraise investments in a sub-basin framework from technical, economic, social and environmental perspectives.
10. This project will initiate improvement in the critical areas outlined above, primarily through targeted investments and technical assistance.

## **2. Rationale for Bank involvement**

11. The proposed project is consistent with the World Bank Group Country Strategy for India (Report No. 29374-IN, September, 2004).
12. The World Bank has supported, and is supporting, the Government of Tamil Nadu’s efforts for sustainable growth and poverty alleviation through a number of projects. Since the management of water and irrigated agriculture is so closely linked to the performance of the economy and creation of employment opportunities, it is important that further reforms and infrastructure modernization be pursued in these areas as a core part of our support to the State.
13. The lessons learned from WRCP indicate that, although a number of reforms have been initiated and selected irrigation infrastructure rehabilitation has been carried out under that project, there is still a substantial need for modernization of irrigation infrastructure, agricultural intensification and diversification using appropriate on-farm technologies (upscaling the Hanuman Nadhi pilot) coupled with skills upgradation in the line agencies and

capacity building of farmers through the water users' associations. The Bank's recent report "India's Water Economy" suggests the need for Tamil Nadu to focus more on effectively applying the "useful building blocks" built so far to resolve its many pressing problems on the water front. It also cautions against a focus on "zero-sum" storage development investments in water-stressed basins where a water management focus may be more appropriate.

14. Tamil Nadu has already taken some important steps in expenditure prioritization (a detailed public expenditure review of the irrigation sector has been done as part of preparation) and is initiating organizational reforms in irrigation and drainage institutions that are vital to improving the delivery of surface irrigation services for ensuring the sustainability of longer-term performance of irrigation infrastructure. Further organizational reforms to streamline business processes to enhance efficiency and transparency and professionalize the work culture will be essential to improving service delivery to the client farmers, reduce costs of service provision, ensure financial sustainability of operations and maintenance of systems and reduce the fiscal burden on the State. Through previous and ongoing engagements, the Bank has established a close working relationship with the GoTN and has developed a good understanding of the problems of the irrigated agriculture and water sectors of the State and has a good assessment of the institutional capacity and what is achievable in the State. The ongoing engagement on cross-cutting knowledge initiatives also has maintained water resources as a key focus area.
15. The GoTN has indicated in several forums that the proposed project is the single highest priority in its requests to the World Bank for assistance, and has shown its commitment and ability through a satisfactory performance in the wide-ranging activities under TN WRCP. The various actions taken by GoTN thus far, are in line with the Bank's Principles of Engagement for irrigation in India, which are elaborated in the current Country Strategy.
16. Bank's worldwide experience in improving productivity of irrigated agriculture would be brought and applied under the proposed investment. Similarly, the global knowledge available at the Bank and elsewhere on water resources management would be made available to the State with accompanying investments.

### **3. Higher level objectives to which the project contributes**

17. The project contributes towards objectives of Sustainable Economic Growth as well as Poverty Alleviation through maximizing productivity of water.

## **B. PROJECT DESCRIPTION**

### **1. Lending instrument**

18. The project proposes to use the instrument of a Specific Investment Loan (SIL) to support GoTN's efforts in enhancing irrigated agriculture and improving overall water resources management in the state.

### **2. Project development objective and key indicators**

19. The proposed project development objective is for selected sub-basin stakeholders to increase irrigated agriculture productivity in a sustainable water resources management framework.
20. In pursuit of this objective, the project will support investments in (i) improving irrigation service delivery including adoption of modern water-saving irrigation technologies and agricultural practices, (ii) agricultural intensification and diversification, (iii) enhancing market access and agri-business opportunities; and (iv) strengthening institutions and instruments dealing with water resources management .
21. Key performance indicators selected for measuring and monitoring progress toward the project's development objective include:
  - Increase in area (hectares) served by irrigation systems in 63 selected sub -basins which have been effectively rehabilitated and modernized .
  - Increase in agricultural productivity (net benefits per unit of water delivered in Rs/m<sup>3</sup>) in the modernized systems.
  - Increase in fisheries production in targeted water bodies (tons/year) .
  - Increase in targeted stakeholders' incomes .
  - Establishment of the State Water Resources Management Agency (SWaRMA) and three sub-basin and one Basin Development and Management Board s by the end of the project
  - Development of good-practice Decision support systems for sustainable water resources management which would be piloted in three sub-basins and one Basin.

### **3. Project components**

22. The project objective is proposed to be achieved through a combination of infrastructure modernization and institutional strengthening efforts both for irrigated agriculture as well as overall water resources management. The specific components of the project include:

#### **Component A: Irrigation systems modernization in a sub-basin framework (Base Cost US\$ 282.83 million)**

23. This component seeks to improve bulk water delivery to irrigation systems through modernization of irrigation systems and service delivery in schemes in about 63 selected project sub-basins (see Map 2 at the end of this document). Activities will be carried out under two sub-components:
24. Sub-Component A1: Tank Systems Modernization (Base Cost US\$241.28 million)  
This sub-component will focus on reviving traditional water bodies (tanks) that are an integral part of most irrigation systems networks in the state. Special effort will be made to consider tanks in a multi-disciplinary, holistic framework to yield sustainable benefits to the farmers of such systems.
25. Sub-Component A2: Other Irrigation Systems Modernization (Base Cost US\$41.55 million)  
This sub-component will focus on the few sub-basins where tanks are not part of the larger canal-irrigated systems. These irrigation systems will also be modernized in a shared-vision sub-basin perspective.
26. The activities in both sub-components will be customized by the line agencies in a coordinated manner for each sub-basin depending on the analysis and stakeholder inputs related to problems and opportunities. The resulting sub-basin plans will underpin demand-driven project investments under this Component.

27. Activities that will be financed by the project include civil works, equipment, consultancies, training, and incremental operational costs associated with modern designs, modernization of control structures such as anicuts (diversion weirs), associated supply channels, cross-masonry structures, desilting of tanks where required based on previous hydrological performance, strengthening and upgradation of the tank bunds (embankments), flow measurement arrangements at each branch canal, distributary and minor offtake (including real-time data acquisition and canal automation systems in selected systems), distribution system upgradation (including selected lining, offtake construction), standardization of canal banks and canal bank roads, and repairs, renovation and modernization of sluices and surplusing arrangements.
28. The work will be carried out primarily by the Water Resources Organization with the involvement of the WUAs. These activities are expected to improve the capacity of the WRO to modernize the manner in which irrigation systems have been designed, rehabilitated, operated and maintained in the past. In particular, these changes would include increased stakeholder participation, increased coordination with other agencies in formulating interventions, use of a sub-basin as a basis to design interventions, use of modern information and analytical systems, moving from routine rehabilitation to substantial modernization through use of modern technical and management techniques.

**Component B. Agricultural Intensification and Diversification  
(Base Cost US\$ 166.23 million)**

29. This component seeks to build on the improved bulk water delivery of the previous component to increase the productivity of agriculture-related activities through improved agricultural intensification and diversification in about 63 selected sub-basins.
30. This component will also be implemented as two sub-components:
  - Sub-Component B1: Tank Systems (Base Cost US\$117.18 million). This sub-component will focus on intensification and diversification of tank-dependent ayacuts.
  - Sub-Component B2: Other Systems (Base Cost US\$47.05 million). This sub-component will focus on the intensification and diversification of the larger canal-irrigated systems.
31. Investments and associated activities under both sub-components will be determined through a participatory sub-basin planning process, which will include relevant stakeholders. The activities supported under this component will be designed in a customized manner for each sub-basin to support the implementation of the sub-basin development plans to improve benefits to farmers, farm laborers, landless, fishermen and livestock owners.
32. Activities to be financed by this component include support for training, goods, civil works, and incremental operating expenses associated with improved larger-scale farm-based demonstrations (intensification, diversification, sustainable agricultural practices, water conservation through farm ponds and drip/sprinkler systems, etc.), awareness-building/training/extension programs (e.g. on higher-value cropping systems, IPM/IPNM/organic farming, on-farm development), promoting the use of improved tools and farm equipment, agro-processing and value-chain improvement support, market infrastructure, information kiosks, market information systems, modern fisheries production systems, and improving livestock health, milk yields, and fodder production.

33. These activities will be implemented by the Government of Tamil Nadu's Agriculture Department, Agricultural Engineering Department, Horticulture Department, Agricultural Marketing Department, and the Tamil Nadu Agricultural University (all of which report to the Secretary, Agriculture) supported by Water User Associations. In addition, the Animal Husbandry Department and Fisheries Department (which report to the Secretary, Animal Husbandry and Fisheries) will implement the livestock and fishery activities proposed. The activities are aimed to set a new paradigm for irrigated agriculture activities in the state through improved coordination and convergence among the project implementing agencies, focusing activities on a sub-basin framework, targeting extension activities to water user associations, substantially scaling-up use of modern techniques (e.g. micro-irrigation systems, farm ponds, SRI for rice, IPM/IPNM, organic cultivation, improved tools, etc.), special focus on market-led interventions, targeted support for agro-processing, improving access to credit, and modernizing associated fishery and livestock systems. Many of these activities are routinely carried out by the implementing agencies; however, this project will help significantly up-scale and better coordinate these activities to improve overall agricultural system productivity to improve farmer incomes.

**Component C. Institutional Modernization for Irrigated Agriculture  
(Base Cost US\$ 52.69 million)**

34. This component seeks to improve the institutional capacity for modern, efficient, and accountable irrigation service delivery. The scope of this activity is state-wide.

35. Under this component funds (for civil works, training, consultancies, goods/equipment, and incremental operating expenses) will be provided to assist GoTN to improve training and sourcing of additional skills relevant to modern irrigation systems management, facilitate systematic change management efforts to modernize the functioning of the WRO, building upon good practice experiences in India and abroad, streamline institutional setup at the WRO, finance memberships in relevant professional associations, improved computerization and office infrastructure, development of an appropriate irrigation knowledge base (including topographic and asset inventory surveys), information systems, analytical capacity, connectivity, and processes to deliver efficient environmentally and socially sustainable and cost-effective irrigation services to farmers via water users associations, and other public-private partnerships. Funds will be provided to assist in the formation and capacity building of about 2500 water users associations and Cluster WUAs (about 10 WUAs clustered on a hydraulic basis to serve as a focus for extension and information technology efforts) in the 63 sub-basins under the project. An Irrigation Research Fund (IRF) with a corpus of about US\$ 3 million (to be revised during project mid-term based on implementation progress) will be set up and used to foster research in irrigation development and management.

36. These activities will be implemented through the WRO and the WUAs. The activities are expected to substantially scale-up the institutional capacity at the WRO to design, monitor, maintain and modernize their assets in an environmentally and socially sustainable manner using appropriate state-of-the-art techniques, and to more effectively interact with much stronger WUAs.

**Component D: Water Resources Management  
(Base Cost US\$ 5.00 million)**

37. The objective of this component is to improve the institutional arrangements and capacity for sustainable water resources management in the State. This will include the creation of a State Water Resources Management Agency (SWaRMA), amalgamating the existing Institute of Water Studies and the State Surface and Ground Water Data Center .
38. This component will finance expert consultants, incremental operating expenses, civil works, training and equipment required to provide additional multi -sectoral expertise (especially on economics, environmental and social aspects, basin analysis and modeling, GIS and remote sensing, planning future water uses, stakeholder communications, etc.). This will be facilitated by activities to enhance analytical and stakeholder involvement (e.g. synoptic basin/sub-basin atlases, decision support tools to plan investments, strategic environmental assessments, structured stakeholder workshops, etc.). In addition, the framework for sustainable water resources management will be strengthened through creation of SWaRMA, and other Basin/Sub-basin Boards (building on the experience of two existing ones for the Palar and Thambiraparani basins). Targeted studies will be financed through enhanced support for the existing Water Resources Research Fund. The Cooum sub -basin will be a special focus to support studies, analysis, stakeholder forums, and demonstrative investments to address the multi-faceted problems in the basin.
39. These activities are to be implemented by the SWaRMA (and its predecessor institutions till this is formed), the WRO, and Basin Boards. These investments should make Tamil Nadu one of the best examples of operationalizing modern Sustainable Water Resources Planning and Management concepts in a basin framework in India.

**Component E. Project Management Support  
(Base Cost US\$ 8.32 million)**

40. This component will support the management and coordination efforts related to this project.
41. In particular, this will support key consultancies (such as for the project Monitoring and Evaluation, internal audit capacity building, specialized multi-disciplinary contract staff), and the necessary civil works (to house the Multi-Disciplinary Project Unit to be combined with the WRO), and goods (including computer hardware, software, connectivity, video/audio conferencing, project library, vehicle purchase and hire, etc.), and operating costs to facilitate inter-agency coordination, project monitoring, adaptive project management, and effective reporting.
42. This component will be implemented by the Multi -Disciplinary Project Unit (MDPU). It is expected that the project activities would help MDPU improve its challenging institutional coordination function, remain on top of the status of project activities, and undertake corrective measures as required.

**4. Lessons learned and reflected in the project design**

43. Key lessons learned from related interventions around the world and in the region as outlined below, have been reviewed and incorporated into the proposed project design and approach.
44. Participation of Stakeholders: Participation and ownership of farmers and their organizations is critical for sustainable irrigation and agricultural intensification and diversification. In the proposed investment, participatory planning, design, implementation and monitoring have

been built in which would instill a sense of ownership, improve transparency and reduce conflicts. In addition, the agriculture intensification and diversification activities have been designed following the ATMA approach to reflect the fact that without farmers' acceptance and ownership, diversification in agriculture will not happen. Involvement of women farmers and NGOs/CSOs as well as using the WUAs as the focal point of all interventions is also built in the project design.

45. Separation of Overall Water Resources Management and Irrigation and Drainage Service Delivery Functions: Lessons from around the world have indicated the value of separating the functions of overall water resources management from irrigation and drainage service delivery. This would avoid substantial conflict-of-interest issues - with the agency responsible for 90% of water consumption also responsible for the management of the resources with other competing demands. The principles of engagement in India reflect this necessity.
46. Emphasis on Institution Building: Experience has also shown that functional strengthening of the institutions involved in irrigated agriculture and water resources management is a requisite for the successful implementation of the project and post-project sustainability. This requires adequate training, exposure visits, and development of adequate knowledge base and appropriate use of information technology (information kiosks for instance) as part of routine business process. Such aspects have been incorporated in the project design.
47. Support for Business Process Re-engineering: Experience internationally and in India (TN WRCP, Rajasthan WSRP, UP WSRP, MP WSRP, Maharashtra WSIP) have indicated that: (i) new business concepts that need to be introduced in irrigation and drainage development, operations and management (Participatory Irrigation Management, Public-Private Partnerships) must penetrate deeply into institutions and change must be comprehensive; (ii) there is a need to better inform and involve sector personnel, politicians, civil society, farmers, other government officials to deal effectively with these changes; (iii) physical infrastructure improvements must be complemented by associated changes in the institutions involved, particularly in the introduction of bottom-up processes to take into account market and production opportunities; and (iv) it is necessary to have cost-efficient, financially viable, well-managed, and user-oriented irrigation and drainage entities to deliver efficient and reliable services.
48. Economic Impact: As shown by the pilot work undertaken in the Tamil Nadu Water Resources Consolidation Project and experience in China and other countries, the economic impact of an irrigation investment is considerably improved by the inclusion of appropriate agricultural components with strong agricultural support services and market linkages and agri-business development concepts at the outset. Project design is firmly based on this concept.
49. Project Implementation Effectiveness: Lessons learned from other projects in India and the previous Bank-financed Tamil Nadu Water Resources Consolidation Project and reflected in project design and agreements are: (i) minimizing turnover of senior staff; (ii) establishing strong procurement and fiduciary capacity in the implementing agencies; (iii) ensuring timely counterpart funding through the establishment of appropriate fund flow mechanisms; (iv) technical, economic, environment and social appraisal of each investment; and (iv) participatory monitoring and evaluation of the project on a continuous basis assisted by third party supervision mechanisms.

50. Procurement Aspects: It is necessary to have efficient procurement organization and procedures from the beginning. In addition, personnel dealing with procurement issues should be absolutely familiar with the procedures and requirements of the Bank. Inadequate knowledge of these aspects have led to substantial delays in project implementation in the past. Frequent training in the Bank's procurement procedures during implementation is necessary, given the turn-over of middle-level staff, to avoid delays due to procurement aspects.

## **5. Alternatives considered and reasons for rejection**

51. The key alternatives considered for the project design include:

1. Only an Irrigation Service Delivery Project: This would have definitely simplified the project design; however, it would not have been possible to assure improvements in farm incomes associated with irrigation without complementary investments in agriculture, horticulture, on-farm irrigation technology development, agricultural marketing, animal husbandry and fisheries. Leaving these to a separate project has not worked in the past since there was no coordinated effort to ensure maximizing outcomes. Hence the decision to have a multi-disciplinary irrigated agriculture intervention.
2. Isolated irrigation investments versus integrated approach in a basin/sub-basin framework: Tamil Nadu is a water scarce State with almost all its surface water resources tapped for use. Isolated investments carry with them the risk of Zero-sum gains. It is necessary to ensure that interventions made in one part of a sub-basin, be it lining to arrest seepage losses resulting in reduced groundwater recharge or small diversions, that these do not affect other users downstream. Hence an integrated approach in a sub-basin context preferred over isolated tank rehabilitation projects.
3. Public Private Partnership versus Privatization: In supporting reforms in irrigation and drainage operations, complete privatization of schemes was also rejected outright since such an option is a non-starter under the prevailing circumstances in the sector. Several preliminary discussions with potential private sector operators as well as Government functionaries have confirmed this view. However, there is strong support for public-private partnerships in developing, operating and managing water resources and irrigation interventions and this option has been accepted in the design of the project.
4. Irrigation Service delivery alone without Water Resources Management: Given the intertwined nature of Water Resources Management and Irrigation Service Delivery, it was decided that the current project needs to consider both. With a substantial portion of the State's water resources having been tapped coupled with rapid industrial and urban growth, pollution of both surface and groundwater has been increasing at alarming rates. Sustainability of the existing developments requires proper handling of both quantity and quality issues, rural-urban competition for water (irrigated agriculture versus other uses) and these have to be addressed in a river-basin framework. Hence the decision to have both irrigation service delivery and water resources management in this project.
5. Asset Modernization alone or Asset Creation as well: Asset rehabilitation and modernization has been opted over creation of any new assets at this stage, particularly since most viable asset creation opportunities have been exhausted already. However, should the decision support systems to be developed in the project sub-basins point towards feasible, sustainable asset creation opportunities, then this option will be considered within the Social and environmental framework developed for the project.

## **IMPLEMENTATION**

### **6. Partnership arrangements**

52. The Government of India will contribute 25% of sub-components A1 and B1 as Grant financing for the restoration and revival of traditional water bodies (tanks). The expenditures of these two sub-components will be tracked separately and will finance parts of the irrigation systems modernization and agricultural intensification and diversification that are related to tank restoration.

### **7. Institutional and implementation arrangements**

53. The project will be implemented over a period of six years. About 60% of the project expenditure will be implemented by the Water Resources Organization, and the remainder by the Government of Tamil Nadu's Agricultural Engineering Department, Agriculture Department, Horticulture Department, Tamil Nadu Agricultural University, Agricultural Marketing Department, Animal Husbandry Department and Fisheries Department, with management support and co-ordination provided by the MDPU. The MDPU will report to a Project Steering Committee (PSC) that has been established to review the progress of the TN IAM WARM at least every six months and provide strategic directions, guidance on policy matters and resolve conflicts, if any, amongst the implementing agencies. The PSC is chaired by the Chief Secretary and comprise the Secretaries to Government of Finance, Planning and the implementing agencies with the Secretary Public Works Department as the Member Secretary. A smaller subset of this committee will be constituted as an empowered committee with government approval to expedite decisions on all procurements and administrative aspects of the project.
54. The MDPU will have representation in all the disciplines that are part of this innovative project and in procurement and financial management aspects. Each sub-basin development plan has to be vetted by the MDPU and the implementing agencies. This will be an iterative process and the final approved sub-basin development plans will be consolidated to form the annual work plan and budget for the implementing agencies. This work plan will be submitted to the Finance Department in time for inclusion in the budget for the following year.
55. Implementation of each activity will be the responsibility of each concerned implementing agency. There will be a designated nodal officer responsible for the preparation of sub-basin development plans in a multi-disciplinary consultative process as demonstrated during project preparation. Monitoring of project activities will be undertaken by an independent consultant under the guidance and supervision of the MDPU.
56. Effective consultative arrangements (involving farmers, WUAs, where set up, and other stakeholders) employed during project preparation will be further strengthened and used in the development of sub-basin development plans.
57. Water resources planning and management will be carried out by the State Water Resources Management Agency or SWaRMA (amalgamated from the Institute for Water Studies and the State Surface and Groundwater Data Center) and Basin development and Management Boards.
58. The institutional capacity will be strengthened to facilitate implementation, particularly with the MDPU, WRO, WUAs, and agricultural extension agencies. Procurement and financial management capacity is being strengthened in all implementing agencies. Established

Environment and Social Management Cells and evolving cells for Participatory Irrigation Management, Information Technology, and Training are being strengthened at the WRO.

## **8. Monitoring and evaluation of outcomes/results**

59. Systematic M&E will be carried out under the project to monitor performance of the project interventions, and to ensure that lessons learned are used throughout project implementation. As the project is being implemented in different sub-basins and interventions will be completed in a phased manner, the M&E system will enable the project to take any remedial action as project implementation proceeds. Availability of innovations in irrigation and agricultural technologies is a prime example.
60. The monitoring and evaluation of project implementation and progress will be under the overall supervision of the M&E cell to be set up in the MDPU. This cell will be assisted by an independent M&E consultancy to be procured by the MDPU under terms of Reference agreed between the Bank and GoTN. The M&E consultant will be engaged by the MDPU by March 31, 2007 and the consultants will begin their tasks by compiling the baseline survey for the first year sub-basin interventions envisaged under the project. The physical implementation of works is expected to begin in April 2007 and the investments in agriculture and allied sectors will begin in the following crop seasons. Formation of new WUAs will also begin after April 2007. The M&E consultancy will cover all project interventions and assist in improving the monitoring parameters as implementation progresses. The consultant will provide quarterly inputs to the MDPU which will enable it to take corrective actions required.
61. In addition to the above, each of the project cells attached to WRO and other line agencies will monitor the activities of their departments against the annual work plan approved prior to March 31 of each year for the following year. These reviews will also be monitored by the MDPU cell.
62. Social audit of the interventions in the irrigation systems, provision of new irrigation and agriculture technologies will be carried out by the WUAs after they have received training in these aspects. The monitoring of all investment actions will be done real-time using the communications and connectivity provided under the project to various stakeholder groups in the first year of implementation.
63. There will be a formal mid-term review of the project based on the M&E reports in September, 2009. This formal review will focus on project progress and impact (as reflected in Annex 3. Results Framework and Monitoring), help devise mid-course corrections needed in project implementation, and mutually agree to the need for additional formal reviews (in addition to the periodic implementation support reviews). The independent M&E consultant will also submit a final evaluation report at the end of the project. The project's impact will be measured against the findings of the baseline survey for each sub-basin.

## **9. Sustainability**

64. Key factors influencing the sustainability of project activities and project design responses have been examined from various viewpoints as outlined below:
65. Technical Sustainability of the modernized irrigation infrastructure depends on regular maintenance and continued operation. The project is supporting capacity-building of the

irrigation service delivery agency to improve their asset inventories, maintenance scheduling, information systems, and training on modern irrigation systems management that should help in this regard. The formation, capacity-building, and involvement of WUAs to be partners in managing and maintaining the system is critical to the sustainable operation of the modernized systems and will be fully supported under the project in the targeted sub-basins.

66. Economic and Financial Sustainability of the modernized systems is critical to effective O&M. The project is facilitating this through support for higher-value crops and higher productivity and institutional strengthening, which are expected to increase water charge collections and tax revenues from surplus produce sales (estimated to reach almost Rs. 350 million annually at the end of the project). The measurement and delivery of water on agreed volumetric principles and capacity-building of WUAs should help with the maintenance. Financial requirements for O&M will be estimated for schemes in each sub-basin and included in the Budget for full funding of these requirements. The farmer contribution to project activities will be deposited in an O&M account for the WUAs to support continued maintenance. Economic analysis of each sub-basin plan will be conducted to ensure economic sustainability. The longer-term sustainable water resources management and water regulation efforts are also expected to result in efficient water allocation across sectors with supporting safety nets to support economic growth in the State.
67. Institutional Sustainability in terms of the way organizations involved with irrigated agriculture interact is crucial to the sustained improvement of agricultural productivity. The project will support the convergence of activities of these institutions (irrigation, and agriculture support services), facilitated by a sub-basin framework. The training and capacity-building, information management, public outreach, and modern planning concepts integrating stakeholder and analytical inputs supported by the project are expected to change the paradigm of irrigated agriculture planning and management in the state. Partnerships among government agencies, WUAs, research institutions, academia, NGOs /CSOs and the private sector will be strengthened under the project (through working together on investment planning and implementation, Water Resources Research Fund, etc.).
68. Social and Environmental Sustainability of the investments and resource base is essential for moving to more sustainable production and management approaches. The project will support institutional capacity-building and awareness-raising on crucial environmental and social development aspects. Stakeholder involvement will be strengthened through forums at farmer, WUA, sub-basin (e.g. in designing and implementation monitoring of sub-basin plans), basin, and state level. The use of social audits through WUAs will be improved. The sub-basin plans will be appraised from a social and environmental viewpoint. The knowledge base, analytical capacity, and stakeholder communications will be improved both on irrigated agriculture and overall water resources management.
69. A strong monitoring system will assist in monitoring sustainability of investments as they are completed. The M&E process and ICRs for each sub-basin will indicate areas for additional focus in terms of improved targeting and sustainability of subsequent project activities. The GoTN has demonstrated strong commitment to the project concepts and to improve sustainability of the investments.

## **10. Critical risks and possible controversial aspects**

70. The key critical risks are related to:
  - Sustained GoTN commitment to the institutional reform measures related to irrigation institutions, particularly to the restructuring of WRO, modernization of irrigation

infrastructure in a transparent manner and devolution concepts related to the formation and fostering of WUAs

- Sustained financial support for the project through timely and adequate releases of counterpart funding
- Staffing of the MDPU with appropriate skill -mix and with adequate tenure.

71. A more elaborate set of risks and the mitigation measures are indicated in the following table:

<b>Risks</b>	<b>Risk Rating</b>	<b>Risk Mitigation Measures</b>
<b>To Project Development Objective</b>		
<u>Waning State support</u> for Irrigation Sector, including budgetary provision for full financing of O&M	M	The project has been designed in consultation with all the implementing agencies. The state has consistently requested support for this project as its highest priority for Bank support. Financial requirements for full O&M will be estimated for the schemes in each sub-basin, and government commitment has been obtained for making budget provisions for fully financing this O&M.
<u>Unwillingness and inability of farmers to form WUAs</u> and participate in the development and implementation of sub-basin development plans	N	Well-designed community mobilization following on the successes of the previous project, awareness creation, synergy with all line departments providing services and judicious capacity building tasks. Previous experience in forming a large number of WUAs in other sub-basins (under a previous project) has been successful and has substantial support both from farmers and the GoTN.
<u>Complexity of coordination</u> across implementing agencies	S	Agencies are integrated together at each sub-basin level in developing and implementing the integrated sub-basin development plans which are constantly monitored by the MDPU, line agencies, and the Project Steering Committee. The project will support the deployment of suitable subject specialists at the MDPU, and improved information flow among the line agencies and MDPU. Appropriate coordination mechanisms at local, district, sub-basin, basin and state levels have been evolved to facilitate inter-agency coordination.
<b>To component results</b>		
<u>Shortage/Frequent Turnover of field staff</u> leading to time/cost overrun	S	Recruitment of additional staff; commitment by GoTN to ensure continuity of staff for at least two years in each sub-basin; need-based outsourcing
<u>Lack of consensus</u> on the sub-basin project activities to be financed	S	Sub-basin stakeholders will be involved throughout the planning, design, implementation, and monitoring stages of sub-basin plans. Investments will be based on an assessment of needs and opportunities. The physical rehabilitation works are based on sub-basin development plans prepared in consultation with the farmers of the sub-basin and the line agency personnel working at the sub-basin level and at the headquarters. Processes such as consultative meetings, joint walkthroughs, and MOUs will be strictly adhered to before the sub-basin development plans are approved for implementation. Water conflicts are expected to be addressed through a number of measures, including institutional setups such as Sub-basin development Committees, and processes such as consultations, grievance redressal framework (in irrigation as well as across sectors), outreach, training, and partnership development.
<u>Problems of implementing change management</u>	M	The project will support establishing an enabling environment and sustained demand for change through dialog, change management efforts, public consultations, improving transparency, awareness-

to facilitate reforms		building, empowering WUAs, and promoting staff professional development. In particular, the project includes substantial support for change management, awareness and capacity-building at all levels of government, the implementing agencies, water users' associations, and civil society. Study tours and exposure visits planned under the project will enhance the awareness of decision makers regarding the restructuring and other business process re-engineering measures.
Lack of continued <u>government priority</u> for institutional reforms	S	The project will support building awareness for the need for improved institutional paradigms (e.g. finding ways for irrigated agriculture institutions to work synergistically). The high-level support currently existing for this is expected to continue and the project will continue building upon the political consensus already achieved .
Since 9 departments are involved in the implementation of the project, there is a risk of <u>delay of timely financial reporting and adherence to internal control</u> such as reconciliation with AG, settlement of advances etc. and the MDPU will have little control over the line departments once the budget is allotted.	M	While this remains an inherent risk, the MDPU, set up under the project will have a key role in approval of the AWP's and the annual budget and revised budget and consolidation of reports from various entities/ line departments and submitting it to the Bank. The finance unit in the MDPU will have staff on deputation with experience on both works accounting and treasury procedures. In addition in each of the line department one accounts staff will be designated responsibilities for the project FM issues.
Risk of <u>delay in funds flow</u> , i.e, procedural delays in issue of LOC or time taken by the departments to allocate funds to the district and divisions		In order to ensure that the funds are made available to the project in a timely manner a legal covenant has been included in the financing agreement which requires the GoTN to make the funds available within two weeks of the request of funds (issue LOC) by the WRO.
<b>Overall risk rating</b>	<b>S</b>	

H-High, S-Substantial, M-Moderate, N-Negligible

72. It is not expected that any of these risks will prove to be particularly controversial during implementation. The issues outlined above can be managed effectively with continued government commitment, constant Bank engagement, and effective supervision and communication.

### 11. Loan/credit conditions and covenants

73. There are no conditions for effectiveness for the Loan and the associated Credit. The key proposed covenants for the project include the following:

74. Tamil Nadu shall ensure:

- a) at all times maintain, in a manner satisfactory to the Association and the Bank, the MDPU headed by a Project Director, who shall be a civil servant with experience in coordination of and working in multiple departments, who shall be assisted by competent staff in adequate numbers and with adequate resources.
- b) by December 31, 2007, establish the SWaRMA as the state-wide focal agency for environmentally and socially sustainable inter-sectoral water resource management;
- c) at all times during the implementation of the Project: (a) maintain the WRO and strengthen its operational capacity as a specialized irrigation service delivery department; (b) maintain the PSC and the WUAs in the Project Area; (c) maintain the MDPU, the SWaRMA, and the cells established within the implementation agencies, all under the supervision of qualified and experienced management assisted by competent staff in adequate numbers and with adequate resources satisfactory to the Association and the Bank.
- d) cause the MDPU to furnish to the Association and the Bank for their review and approval, by November 15 of each year until completion of the Project, commencing on November 15, 2007, the Sub-basin Development Plans prepared by the agencies involved in the implementation of the Project, together with the Annual Work Programs and budget estimates in connection with the following year, and proceed thereafter to coordinate the carrying out of the said Annual Work Programs taking into account the Association's and the Bank's comments thereon.
- e) carry out the Project in accordance with the Operations Manual, the ESA, the ESMF, the Transparency and Accountability Plan and the Annual Work Programs, and shall not amend or waive any provision of the Operations Manual, the ESA, the ESMF, the Transparency and Accountability Plan and any of the Annual Work Program, except as the Association or the Bank shall otherwise agree
- f) within three (3) years of the Effective Date, take all necessary action required on its part to establish a required number of WUAs in all of the sub-basins in the Project Area;
- g) within ninety (90) days of the Effective Date, place in position an executive engineer for each sub-basin or cluster of sub-basins in the Project Area, with reasonable tenure to ensure effective Project implementation, to act as nodal officer for the development and implementation of Sub-basin Development Plans, and to ensure, within each sub-basin, that a sub-basin development unit has been established with appropriate staffing and resources to prepare and implement Sub-basin Development Plans;
- h) ensure that the installation and testing of computer equipment and communications infrastructure in WRO's offices shall take place not later than December 31, 2008.
- i) take all necessary measures required on its part to establish by December 31, 2007, and thereafter maintain, in a manner satisfactory to the Association and the Bank, a funding mechanism to provide Grants from the Irrigation Research Fund to Grant Recipients for applied research in improved irrigation technologies.
- j) ensure that, within two (2) weeks from receiving a funding request from WRO in connection with the financing of any given Annual Work Program, the Project Implementing Entity's Finance Department shall arrange for the issuance of a letter of credit in an amount sufficient to cover WRO's semi-annual requirements to finance Project activities covered under the Annual Work Program.
- k) within ninety (90) days of the Effective Date, take all necessary action required on its part to employ consultants, in accordance with the provisions of Part C of Section III of Schedule 2 to the Financing Agreement, to undertake monitoring and evaluation activities under the Project;
- l) within six (6) months of the Effective Date, place in position a suitable internal auditor, pursuant to terms of reference acceptable to the Association and the Bank; and

- m) within thirty (30) days of the Effective Date, establish, and thereafter maintain, with experienced staff in adequate numbers and sufficient resources: (i) a participatory irrigation management cell whose main responsibility shall be to strengthen the institutional capacity of the WUAs, and strengthen the capacity of the WRO to provide services to farmers; (ii) an information technology cell whose main responsibility shall be to oversee the implementation of computerization and connectivity activities, and facilitate the functioning of a web -based information management system; and (iii) a training cell whose main responsibility shall be to coordinate training activities on the basis of an annual training plan prepared by the training cell in consultation with the MDPU and the WRO.

## **C. APPRAISAL SUMMARY**

### **1. Economic and financial analyses**

***Economic Analysis: NPV= Rs. 8.6 billion (US\$ 191 million); ERR=20.4%***

75. The project focuses on modernizing irrigation systems and optimizing the productivity of irrigated agriculture in about 617,000 ha of registered ayacut in 63 sub-basins, out of which only 55% area gets fully irrigated now. Strengthening water sector related policy framework and institutional modernization and sub-basin specific physical interventions for modernizing irrigation infrastructure with agriculture intensification and diversification are proposed to optimize and sustain the agriculture productivity in the project area. Detailed sub-basin wise analysis was done for a representative sample of nine sub-basins spread over three major agro-climatic zones of the state to capture the non-homogeneous production and resource environment in the project area. The economic and financial analysis of the project is projected based on these nine sample sub-basins (Annex 9). The analysis covered major investment activities including irrigation system modernization and agriculture intensification and diversification including livestock and fisheries, accounting for 87% of the project costs. The main project benefits quantified are expected gains from agriculture intensification and diversification (including livestock and fisheries). As a result of proposed project interventions, the following have been quantified: area expansion, increased productivity and market-led shift into higher-value crops in irrigated agriculture; increased milk productivity as a result of sub-basin specific integrated breed-health-feed management programs; and increased fish productivity as a result of comprehensive fish seed -stocking-feed-management programs. The analysis, however, does not quantify benefits due to forward and backward linkage effects of modernized, intensified and diversified agriculture in the project sub-basins, nor policy and institutional reforms designed to improve sustainable water resources management and irrigation service delivery, and to that extent understates the likely economic impact of the project.

76. The economic rate of return (ERR) is estimated to be 20.4% for the project. For individual sub-basins, the ERR varies from 13 to 30.2%. The project is expected to yield net present value of Rs. 8.6 billion in 2006 prices over a 25-year project cycle. Sensitivity analysis, performed for lower benefit levels (20%) or higher cost levels (20%) as compared to the base levels resulted in lower ERR (15.4 to 16.3%) but still remained sufficiently above the opportunity cost of capital. Switching ERR values for costs and benefits are estimated. For reducing the ERR to 12% from the base level, costs will have to increase by 50% or benefits will have to fall by 33%, indicating the robustness of the project investments.

***Financial Analysis: NPV= Rs. 12.4 billion (US\$ 276 million); FRR=23%***

77. The estimated financial rate of return (FRR) for the project is 23% with Net Present Value of Rs 12.4 billion at 2006 prices. Sensitivity analysis carried out for a scenario with 20% rise in costs together with 20% reduction in benefits indicates the FRR to be still robust at 13.7%.

## 2. Technical

78. The project proposes many technical improvements relating to (i) irrigation service delivery; (ii) on-farm irrigation technology; (iii) modern agricultural practices; (iv) public-private partnerships in animal husbandry and fisheries; (v) value chain and market linkages; and (vi) agribusiness aspects. The key challenge lies in the integration of technical aspects to institutional capacity and business processes. These include: technical and managerial upgrading of irrigation systems, introduction of modern flow measurement technologies with remote transmission, development of modern decision support systems, information management and communication systems, telemetry and related systems, adoption of modern surveying techniques, introduction of new irrigation delivery systems including drip and fertigation, use of SRI techniques in paddy, market intelligence and agri-business opportunities driving diversification and the full participation of the WUAs in all of the above for sustainability. The effective and sustainable adoption of these technical options will require intensive awareness building and training and a “learning by doing” approach in the line agencies as well as WUAs. The scale of such training, awareness creation and capacity building for all stakeholders is substantial. Support has been provided for this operation under this project.

## 3. Fiduciary

79. **Procurement:** The procurement under the Project will be carried out by 9 Implementing Agencies of GoTN namely Water Resources Organization WRO, Agriculture Engineering Department, AED, Agriculture Department, Horticulture Department, Agriculture Marketing Department, Animal Husbandry Department, Fisheries Department, Tamil Nadu Agricultural University and Multi Disciplinary Project Unit [MDPU]. The management support and coordination amongst all the implementing agencies will be provided by the MDPU who will act as single window contact for the Bank.

80.

81. Works for about 60% of the project cost under the project will be procured by WRO which will be for rehabilitation and modernization of tanks and canals and is the major component of the project. In WRO, the procurement cell headed by a Joint Chief engineer, reporting directly to Engineer-in-Chief has been established. Joint Chief Engineer will be supported by adequate staff. All these staff will be progressively in position by the end of December 2006. These engineers/staff will receive procurement training through ASCI, Hyderabad or NIFM, Faridabad. This cell will work like a technical secretariat to Engineer-in-Chief who is the Chairman of the tender award Committee. The bid documents and evaluation reports of the packages requiring the approval of Tender Award Committee, to be prepared by the respective engineers in the district/field, will first be reviewed by this cell and then forwarded to the Tender Award Committee for approval. After approval, the bid documents and evaluation reports requiring the Bank's prior review will be forwarded to MDPU for forwarding to the Bank and obtaining the Bank's clearance/no objection. The procurement to be made by WRO will be handled by Executive Engineers and Superintending Engineers in the 63 sub-basins operating under four regional Chief Engineers. Further Chief Engineers will also be involved in Procurement related activities like review of award recommendation.

82. The works for recharge structures, farm ponds and other on -farm development works which will be about 15% of the project cost will be procured by Agriculture Engineering Department. Works and goods to be procured by other departments will be small value procurement, and will be procured following mostly shopping procedure.
83. The procurement of the key Consultancies under the Project will be carried out by the MDPU, WRO and SWaRMA., a body still to be constituted from existing WRO units.
84. WRO, as a part of PWD, has earlier executed TNWRCP project funded by the Bank. However, there is still a need to train the staff of WRO and other agencies on Bank-financed procurement. The following capacity building steps have been/will be taken:
- (a) MDPU has a procurement wing consisting of one Executive engineer, one Assistant Executive Engineer and one Assistant Engineer/ Junior Engineer. All these three officials have already received procurement training at ASCI Hyderabad. This cell will be further strengthened as per requirements.
  - (b) Nodal Procurement Officers of the line departments have been placed directly under the head of Department as the Procurement in charge.
  - (c) The MDPU has given one day orientation to the procurement officers of all line departments and the nodal officer of each sub -basin.
  - (d) Training will be given to all Nodal procurement officers of all line departments and the WRO procurement cell at ASCI or similar institute [NIFM] or by organizing training in Tamil Nadu by the said agency/person. This will be arranged in the first year subject to availability of ASCI and/or NIFM.
  - (e) Procurement workshops will be held in Tamil Nadu for all the SEs and Executive engineers of sub basins and nodal officers of the line departments and their replacement on transfer, if any.
  - (f) Annual refresher course will be held to train any new entrant to the project.
85. The Bank will also organize procurement workshops, one in each of the four regions where officials of all the departments involved in procurement may participate. The first of such workshops will be held before March 31, 2007.
86. All procurement of works, goods and services [other than consultant services] under the project will be as per the Bank's Procurement Guidelines, May 2004 and that of Consultancy Services, as per Bank's Consultant's Guidelines, May 2004. For procurement of goods and works, the Bank's Standard Bidding Documents (SBD), as agreed with GoI Task Force will be used as a base and agreed with New Delhi Office of the Bank. Similarly for procurement of Consultancy services, Bank's standard Request for Proposals (RFP) will be used as a base and agreed with the Bank's New Delhi office.
87. In view of nine agencies being involved with the procurement, there will be a need of greater efforts by the MDPU to ensure consistency of the proposals being forwarded to the Bank and also those under the post review. The Bank's efforts will also be substantial in the beginning stages of implementation.
88. **Financial Management:** Overall, financial management arrangements as proposed for the project are considered to be adequate to account for and report on the project expenditure as well as satisfying the fiduciary requirements of IDA. Since the project is largely to be implemented by various line departments, based on the findings from the preliminary State

Financial Accountability Assessment, experiences with on-going Bank projects in the State and in-depth assessment of three line departments, the FM arrangements have been built on and integrated with GoTNs own systems for budgeting, funds flow, accounting and internal control with specific strengthening in areas of internal audit, enhanced administrative & financial delegation, and financial reporting have been agreed. The detailed arrangements are documented in Annex 7.

89. The project will be budgeted by project components and implementing agency and by sub-basins (which are the unit for planning for Components A and B) in the GoTN budget on the expenditure side with corresponding provisions in the receipt side in the State Budget. This will facilitate accounting by components using mainstream government accounting systems. The annual budget will be supported by a detailed Annual Work Plan which will be reviewed and approved by the MDPU. The Finance Dept. will issue LOC to WRO (within two weeks of the request from WRO) and make funds available to other departments through the treasury system based on their quarterly requirement of funds, which will in turn reallocate these funds (LOC/ budgets) to various divisions/ districts. The project will provide quarterly interim financial reports and annual audited financial statements (statement of sources and uses of funds) broken down by project components (and by sub basins) by line departments.
90. **Audit:** The Comptroller and Auditor General of India (C&AG) through its offices in Tamil Nadu will be the external auditor for the project. The C&AG's office will conduct an annual audit of the financial statements of the project covering all sources of funds. The audit report will be submitted to the Bank within six months of the close of each financial year. The Terms of Reference will be sent to the C&AG (through the GOI) for their consent. This will be supplemented by internal audit of the project (various line departments) as per TOR approved by the Bank.
91. **Disbursement Arrangements:** The Bank will finance 90% of the eligible expenditure incurred by the GoTN to meet the project costs (outlined in Annex 5). Funds from the World Bank will be made available to GoTN (through the GoI) under the standard on-lending arrangements between GoI and the States. With respect to expenditure on the restoration of tanks, which is to be partly financed by the GoI (to the extent of 25%), IDA funds equivalent to USD 75 million will be transferred by GoI to GoTN as grant, upon incurring expenditure by the project. The Bank will provide an initial advance which will be transferred by GoI to the GoTN. Subsequent releases will be on re-imburement basis, based on Bank's share of eligible project expenditure. This will be determined on the basis of the interim expenditure reports (Component wise and by sub-basin) from the AG's accounting system and confirmed by annual audited financial statements.
92. **Retroactive financing:** Upto US\$1.5 M equivalent will be available for financing eligible project expenditures incurred before loan/financing agreement signing, but on or after March 1, 2006.

#### **4. Social**

93. In Tamil Nadu, there is a rich tradition of community-based water management including management of tanks and traditional water harvesting structures. However, some of these are not functional due to the emergence of centralized Government controlled systems of irrigation service delivery after independence. While there are social issues of exclusion, caste and class dynamics amongst village communities, the more difficult interface in an

irrigated agriculture modernization project is the one between the farming community and the departmental functionaries of the Water Resources, Agriculture, Horticulture, Agriculture Engineering, Agriculture Marketing, Fisheries, Animal Husbandry departments.

94. There are several good examples across the State of either age-old traditional water management systems continuing to exist for several decades or of communities having formed their water user associations (WUAs) as part of donor or State funded projects and managing to recover costs from members, put in place excellent arrangements for equitable water management etc.. As was experienced during the initial years of the Tamil Nadu Water Resources Consolidation Project (TNWRCP), the key issue clearly is a systematic approach to mobilizing communities and providing capacity building inputs towards putting in place water management systems that ensure that norms of equity, transparency, accountability and inclusion are adhered to by one and all. This will be one of the key areas of focus of the TN-IAMWARM project towards helping build effective social capital amongst communities who through their WUAs are expected to take on central responsibility for both irrigated agriculture modernization and water resources management.
95. Under the project the important social issues to be addressed by WRO and allied line departments through WUAs include: (i) ensuring participation, inclusion and enhancing equity, (ii) decentralizing irrigation and agriculture and allied services delivery based on the principle of subsidiarity; (iii) enabling participation of all sections of the community including in particular the disadvantaged sections including women; (iv) improving the ability of farmers to undertake agribusiness activities in coordination with ATMAs, private sector institutions and facilitating Government line departments; (v) support for community capacity building; (vi) change management, enabling transformation of the WRO and allied government departments into 'facilitators'. These issues are further described in Annex 10.
96. Social Safeguards: The detailed Environmental and Social Assessment (ESA) has been adopted by GoTN and outlines a Social and Environmental Management Framework (SEMF) to guide project design and implementation. No adverse impacts are expected on tribal/indigenous communities and the ESA has identified possible ways of enhancing the positive impacts of project activities on tribal communities where they exist in the project area. Even though, prima facie, there is not major land acquisition or resettlement and rehabilitation expected under the project, the ESA provides a detailed framework and guidelines for implementing, Land Acquisition and Resettlement and Rehabilitation that is built on the good practice examples set under the TNWRCP- the predecessor project. If and when required, this framework shall be used as outlined in the ESA and SEMF.

## **5. Environment**

97. Some of the environmental issues that need to be addressed in the project include the need to strengthen the mainstreaming of environment in irrigated agriculture and water resources development and management, need for a consistent and adequate environmental knowledge base and analytical capacity in the water sector, and awareness -building on environmental aspects of water and irrigated agriculture.

98. Project preparation has included the development of an Environmental and Social Assessment that includes a detailed Environment and Social Management Framework for the project, with focus on institutional/monitoring aspects as well as for physical investment distributed over about 63 selected sub-basins in the State. The environmental and social knowledge base is being strengthened, awareness and training activities on these issues are being enhanced, and approaches to strengthen mainstreaming of environmental and social issues in the preparation and implementation of basin plans are being strengthened. These include effective consultation with stakeholders, focus on integrated pest management and plant nutrient management, encouragement of organic farming, improving water conservation and productivity improvement (e.g. through promotion of drip/sprinkler systems, diversification, use of SRI techniques in Paddy, etc.), improved fisheries with local species, and other pollution and resource management approaches. These issues are further described in Annex 10.

## 6. Safeguard policies

<b>Safeguard Policies Triggered by the Project</b>	Yes	No
<a href="#">Environmental Assessment (OP/BP 4.01)</a>	[ X ]	[ ]
Natural Habitats ( <a href="#">OP/BP 4.04</a> )	[ ]	[ X ]
Pest Management ( <a href="#">OP 4.09</a> )	[ X ]	[ ]
Cultural Property ( <a href="#">OPN 11.03</a> , being revised as OP 4.11)	[ X ]	[ ]
Involuntary Resettlement ( <a href="#">OP/BP 4.12</a> )	[ X ]	[ ]
Indigenous Peoples ( <a href="#">OP/BP 4.10</a> )	[ ]	[ X ]
Forests ( <a href="#">OP/BP 4.36</a> )	[ ]	[ X ]
Safety of Dams ( <a href="#">OP/BP 4.37</a> )	[ X ]	[ ]
Projects in Disputed Areas ( <a href="#">OP/BP 7.60</a> )*	[ ]	[ X ]
Projects on International Waterways ( <a href="#">OP/BP 7.50</a> )	[ ]	[ X ]

99. Although the physical investments will be primarily of a rehabilitation type and are not expected to result in any major adverse environmental or social impacts, an Environmental category A classification has been adopted (the safeguard screening classification for this project is S1). This is due to the spatial scale of investment, the new nature of some of the activities, the possible cumulative impacts of multiple components in a scheme area, and the number of Bank safeguard policies triggered.

100. The key safeguard issues, consultations held, ESA findings, and SEMF outline are described in Sections D4, D5 and Annex 10. The capacity of the implementing agencies to adequately address environmental and social issues is currently weak and is targeted to be improved in the project through provision of staff, consultancy services, training, NGO /CSO involvement and other partnerships and this will be closely supervised. The recommendations of the ESA and SEMF have been reflected in the project design and costing. The safeguard documents were initially made available at the Bank InfoShop and in Tamil Nadu from March 2006, with updated versions subsequently.

\* By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas

## **7. Policy Exceptions and Readiness**

101. There are no policy exceptions for this project. Elements of project readiness include:

- Commitment from GoTN for successful project implementation evidenced by various communications from GoTN consistently informing the Bank and the GoI of the priority it attaches to this project
- A multi-disciplinary project unit is in place headed by a project director from the Indian Administrative Services (rank equivalent to just below the Secretary to Government for the Public Works Department )
- Procurement Plan and associated procurement packages have been prepared for the first eighteen months and the bid documents (for about US\$90m) for the award of civil works contracts to be initiated during PY1 are ready for publication
- General Procurement Notice is ready and will be published before December 31, 2006
- Notices inviting Expression of Interest for Topographic and Cadastral surveys, Project Monitoring and Evaluation Consultancy, Technical Examination of Works Consultancy, Design of modern irrigation systems, Training and Capacity Building and Enterprise Information Management Systems are ready and will be issued before December 31, 2006
- Bid documents for purchase of computers and related connectivity equipment have been prepared
- Draft Project Operations Manual (POM) has been prepared by GoTN
- Disclosure requirements have been met
- Project preparation, implementation, monitoring and coordination cells have been established at the Secretariat for Agriculture, Horticulture, Agricultural Engineering, Animal Husbandry, Fisheries, Agricultural Marketing and at the Engineer-in-Chief's office for Water Resources Organization

## Annex 1: Country and Sector or Program Background

### INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project

**Background:** Tamil Nadu is a state at the southeastern tip of India with a population of 62 million (2001 census) living on an area of 130,000 km<sup>2</sup>. There are about 27 cities/urban agglomerations, 111 towns and over 16,000 villages in the 30 districts of the state. Although agriculture accounts for only 15.7 percent of total GSDP, farm income accounts for about half of household income for 35 million people (56 percent of the state's population) who live in rural areas. Much of this rural population is poor, with estimates ranging from 7.4 million people (20.6 percent of the rural population) to 11.4 million (31.8 percent of the rural population). For the poorest rural quintile (approximately 1.5 million households, or 7.5 million people), more than three-quarters of income is derived from agriculture, with agricultural wage labor alone accounting for half of household income. Given the importance of agriculture in the incomes of the poor in Tamil Nadu, growth in labor-intensive agriculture could further reduce rural poverty through higher yields to small producers, higher real wages to agricultural laborers, and increased income and employment opportunities with forward and backward links to the rural non-farm sector. Faster growth in agriculture is central to sustainable development and poverty reduction in Tamil Nadu.

Tamil Nadu's geographic area can be grouped into 17 river basins (see Map 1 at the end of this document), a majority of which are water-stressed. There are 61 major reservoirs, about 40,000 tanks (traditional water bodies) and about 3 million wells, that heavily utilize the available surface water (17.5 BCM) and groundwater (15.3 BCM). Agriculture is the single largest consumer of water in the state, using 75% of the state's water. Irrigation through a combination of canals, wells, and tanks increases the reliability and availability of water for farming and is essential for cultivating crops in much of the state. Approximately 30% of the net irrigated area of 3 million hectares is watered by canals and 21% by tanks, while 49% is fed by wells. The remaining area is irrigated by other sources such as streams and springs. Tanks (system, non-system, and rainfed) are an integral part of the irrigation system in the state. Rainfed agriculture, employing approximately 25% of farmers, accounts for 46% of the net sown area of 5.5 million hectares.

Water is critical to the economy of the state of Tamil Nadu and the livelihood of its denizens. The state is quite water stressed, as supplies are limited and demands are growing. It is one of the driest states in India, averaging about 925 mm of rainfall in a year, receiving rainfall in both the south-west and north-east monsoons primarily in the hilly and coastal areas. Per capita availability of water resources in Tamil Nadu is only 900 cubic meters a year, compared with 2,200 cubic meters for all of India. The state's dry season lasts five months (January through May) even in good years, and severe droughts occur in 3 of 10 years, severely limiting cultivation of crops between June and September. A recent series of droughts and water shortages has highlighted the importance of good water resources and irrigation management. Despite the general water scarcity, parts of the state experience floods occasionally. Water quality threats (from municipal and industrial effluents and solid wastes, saline water intrusion, natural sources, etc.) are increasing in surface and ground waters. The state's groundwater is at risk from overdraft, saline intrusion, and pollution (about half the administrative blocks in the state are over-exploited, saline or in a critical state).

There are multiple demands (municipal, industrial, irrigation, hydropower, environment, in-stream community use, etc.) on the scarce water resources. Over 2 million hectares of land is

irrigated from wells, canals and tanks in the state out of a total 5.5 million hectares of cropland. Over 62 million people depend on stressed water resources for their domestic use, and more than half of them depend on agriculture for their livelihoods. The state has the highest proportion of urban population (compared to other large states in India) with 44% of its population living in urban areas. This urbanization, combined with substantial industrialization (over 20,000 significant industries currently), has led to pressures on the state's limited water resources, both in terms of the need to keep pace with rapidly rising water requirements and in managing the water quality of the surface and ground waters (such as with the polluted Cooum river that flows through Chennai). Almost 10 million cattle, 12 million sheep and goats, and over 80 million poultry place additional demands for water and feed. Inland fisheries production in reservoirs, tanks and wetlands are over 77,000 tons every year.

A recent Bank report<sup>1</sup> has shown that the agriculture sector in Tamil Nadu faces major constraints due to poor quality irrigation infrastructure coupled with water scarcity (both quantity and quality) due largely to growing demands from industry and domestic users and intensifying interstate competition for surface water resources. In some parts of the state, the rate of extraction of groundwater has exceeded recharge rates, resulting in falling water tables. Water quality is also a growing concern. Effluents discharged from tanneries and textile industries, untreated municipal and domestic wastes, and heavy use of pesticides and fertilizers have had a major impact on surface water quality, soils, and groundwater. Long-term growth in agriculture and rural income depends in large part on increasing efficiency of use of water. In addition, diversification into higher value, less water-intensive products, such as fruits, vegetables, spices, and livestock products, may be one of the most promising sources of agricultural growth. Tamil Nadu's agro-climatic conditions are well-suited for diversified agriculture and some diversification has been initiated in more progressive areas, moving away from traditional water-intensive crops such as rice, sugarcane, and banana. Rapidly increasing incomes and changing patterns of food demand also provide strong impetus for diversification. Increased agricultural diversification and private investment in higher-value processing are likely to generate new rural non-farm employment opportunities and raise rural incomes. Increased availability of water and greater efficiency of water use in the dry season (for example, through the widespread adoption of drip irrigation) could enable cultivation of crops year-round, increasing employment in agricultural production and processing, benefiting the rural poor. Improving efficiency of water use and diversification require improved irrigation service delivery together with better resource management measures. This requires asset modernization with a multi-sectoral perspective, focus on market linkages, as well as technical and managerial upgrading of asset developers, users and managers.

Key GoTN actions to address these issues are described in Section A1 of this Project Appraisal Document.

### **Additional Work Required:**

Many of the actions taken by the GoTN serve as a good foundation to further the reform processes and to move towards a more efficient irrigation service delivery and improved resource management. However there are still a few key issues remaining to make the reforms deeper and more sustainable, and the IAMWARM project aims at assisting Tamil Nadu to effectively address these issues.

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<sup>1</sup> Tamil Nadu Agricultural Development November 2004 by Paul Dorosh and Mona Sur of the South Asia Agriculture and Rural Development Unit

## ***Irrigated Agriculture and Diversification***

Modernization of irrigated agriculture management and promoting diversification to improve water productivity is essential to address rural development in Tamil Na du. Additional work is required in the following areas:

- The approach to operation and maintenance needs to be improved. As is common in many Indian states, further focus is required to meet well-analyzed operations and maintenance requirements in order to prevent further deterioration of surface irrigation systems not covered under the earlier Bank project. Traditionally, there has been minimal involvement of farmers in the operations and maintenance of irrigation systems. The current provisions for surface irrigation water charges allow full cost recovery for required operations and maintenance expenditures . However, these charges have not been consistently collected. The Government has to put in place a consistent framework for collection of water charges to meet full O&M expenditures
- Participatory irrigation management has to be strengthened and rolled out state -wide. Irrigation management transfer is at an early stage in Tamil Nadu but making substantial progress with the enactment of the FMIS Act. About 1600 Farmers’ Councils (Water Users’ Associations) have been set up and another 2500 need to be set up covering the project area. These associations need considerable training and capacity building to manage irrigation systems under their purview.
- Agricultural diversification has to be promoted to increase the productivity of water. Paying greater attention to market infrastructure, strengthening research and extension, and improving irrigation pumpset efficiency will foster diversification.
- Greater attention is needed for modernizing irrigation infrastructure and scaling -up the adoption of water saving irrigation technologies. While the use of sprinkler and drip technology has been promoted in the state, the high capital cost of these technologies constrains widespread adoption by smallholders and marginal farmers. The development of more affordable technologies or a suitable system of targeted incentives to increase the use of sprinkler and drip systems are issues to consider in this regard.

### ***Water Resources Management:***

Improving the way water resources planning and management is undertaken is central to improving the productivity of water in the State. This requires a concerted effort to improve the existing institutional environment in managing these problems.

There has been substantial work as outlined earlier on many of these aspects, making Tamil Nadu one of the leading states in India in terms of exploring new paradigms of water resources management. However, key fundamental challenges remain, primarily on the institutional front, for the State to effectively manage its valuable water resources and move beyond project -to-project activity.

Many actions required to improve and sustain the productivity of the water resources in Tamil Nadu fall through institutional gaps such as:

- Lack of an effective institutional focal point and enabling policy environment and instruments for sustainable water resources management (including improving inter -agency interaction, stakeholder consultation, awareness -building, and strengthening of technical skills)
- Problems of fragmented, outdated, often inaccessible and inconsistent knowledge base, lack of effective modern analytical tools for managing the State’s water
- Need for a broad base of adequate skills, partnerships, and structured stakeholder processes in using the resource base to effectively address critical current and future water problems

A single project cannot hope to address all these areas fully and the IAMWARM project seeks to address the most critical areas outlined here through appropriate institutional strengthening and coordination mechanisms as well as investments to help “learning by doing” to help improve the productivity of water in the State.

## Annex 2: Major Related Projects Financed by the Bank and/or other Agencies

### INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project

Project Name	Approval date	Status	Loan Size (US\$M)	Project Summary	Related sector issues	IP Rating	DO Rating	OED rating (completed project)
Maharashtra Water Sector Improvement Project (Ln.4796)	June 23, 2005	Active	325.00	The project development objectives are to strengthen the state's capacity for multi-sectoral planning, development and sustainable management of the water resources and improve irrigation service delivery and productivity of irrigated agriculture.	Need to address both irrigated agriculture performance and water resources management	S	S	
Assam Agricultural Competitiveness Project (Cr.4013)	November 12, 2004	Active	154.00	The objective of the project is to increase the productivity and market access of targeted farmers and community groups.	Lack of capital in farm and rural communities for productivity investments, inadequate market linkage / poor rural road networks	S	S	
Madhya Pradesh Water Sector Restructuring Project (Ln.4750)	September 7, 2004	Active	396.00	The project development objective is to improve productivity of water for sustainable growth and poverty reduction in selected focus river basin (Chambal, Sindh, Ken and Tons) of Madhya Pradesh.	Institutional reforms in water resources management as well as for irrigation service delivery and improvement and modernization of physical assets	S	MS	
Hydrology Project Phase II (Ln. 4749)	July 19, 2004	Active	105.51	The project development objective is to extend and promote the sustained and effective use of the Hydrologic Information System (HIS) by all potential users concerned with water resources planning and management, both public and private, thereby contributing to improved productivity and cost effectiveness of water related investments in 13 States and 8 central agencies.	Systematic collection, quality control, sharing, and use of hydrologic information, development of decision support systems for water resources planning and real-time operational support	M	S	
Karnataka Community Based Tank Management Project (Cr. 3635-IN)	25 April 2002	Active	98.9	Project objectives are to improve rural livelihoods and reduce poverty through community based Tank irrigation. The project would strengthen community-based institutions and improve tank systems, including physical interventions, training and on-farm demonstrations.	Rehabilitation of degraded tank systems, stakeholder participation, community-based procurement	S	S	

UP Water Sector Restructuring Project (Cr. 3602-IN)	19 February 2002	Active	149.2	The project seeks to improve the productivity of water and irrigated agriculture through strengthening of institutional capacity for water resources management and irrigation and drainage services, and modernization of selected physical assets.	Unbundling water resources management from service delivery, tariff regulation, WUA strengthening, Irrigation Department Business Process Reengineering, capacity building, PPP	MU	S	
Rajasthan Water Sector Restructuring Project (Cr. 3603-IN)	19 February 2002	Active	140.0	The project strengthens WR planning, development and management and increases irrigated agriculture productivity through institutional strengthening and improved irrigation systems	Unbundling water resources management from service delivery, groundwater management, tariff regulation	S	S	
Madhya Pradesh District Poverty Initiatives Project (Cr.3430-IN)	07 November 2000	Active	110.1	Project objective is to improve opportunities for the poor and vulnerable, especially women to meet their own social and economic development objectives. The project focuses on social organization and empowerment, improved local governance, capacity building and community-initiated sub-projects, including rural infrastructure	Decentralization, demand-driven approaches to rural livelihood improvement	S	S	
Andhra Pradesh Economic Restructuring Project (Irrigation Component)	June 25, 1998	Closed	70	Projects aims at improving the irrigation service delivery through effective involvement of Water Users Associations, rationalizing of water charges to meet full O&M needs, irrigation systems rehabilitation and restructuring of irrigation department.	(i) poor and unsustainable irrigation service delivery, (ii) lack of users involvement in irrigation management, and (iii) poor cost recovery	U	U	
National Agricultural Technology Project	March 17, 1998	Closed	Cr. 73.8 Ln. 96.8	The main objectives of the project were to: (i) improve efficiency of the Indian Council of Agricultural Research Organization and Management Systems, (ii) enhance the performance and effectiveness of priority research programs and of scientists in responding to the technological needs of farmers, and (iii) develop models that improve the effectiveness and financial sustainability of the technology dissemination system with greater accountability to, and participation by, the farming communities.	(i) avoiding technology vacuum and productivity gap, (ii) addressing poverty and sustainability issues, (iii) evolving public-private interaction, (iv) bridging gaps in research and improving research quality, (v) improving management systems, and (vi) increasing community ownership and participation.	S	S	

Tamil Nadu Water Resources Consolidation Project (Cr. 2745-IN)	20 June 1995	Closed	282.9	The project's objectives were to strengthen the irrigation sector and the State's related institutional capacity through irrigation infrastructure system improvement and completion; water planning and environmental management; and institutional strengthening	Critical infrastructure improvement, river basin organizations, knowledge base and DSS development, strategic environmental frameworks and strategies, WUA formation and strengthening, groundwater regulation	S	S	S
Third Andhra Pradesh Irrigation Project (Cr. 2952-IN/ Ln. 4166-IN)	May 20, 1997	Closed	Cr. 150 Ln. 130	Project aims at completing the left over work of Second Andhra Pradesh Irrigation Project and also, to improve irrigation management, mitigate adverse social impacts of land acquisition for irrigation works and dam safety	(i) long delays in completion of ongoing irrigation works, (ii) poor and unsustainable irrigation service delivery, (iii) lack of users involvement in irrigation management, and (iv) poor cost recovery	S	S	
Hydrology Project (Cr.2774-IN)	22 August 1995	Closed	142	The project assisted GoI and nine states to develop comprehensive easily-accessible hydrologic information systems using common standards, processes and procedures. The project financed improved hydrological and hydro-meteorological data networks and data processing systems, TA and institutional strengthening.	Hydrological knowledge base development	S	S	
Dam Safety Project (Cr. 2241-IN)	14 May 1991	Closed	153	The project's objectives were to: strengthen institutions concerned with dam safety assurance at central and state levels and to upgrade the safety features of 33 dams.	Disaster management, knowledge base and institutional capacity building	S	S	Uncertain

### Annex 3: Results Framework and Monitoring

#### INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project

PDO	Project Outcome Indicators	Use of Project Outcome Information
Sub-basin stakeholders increase the productivity of irrigated agriculture in a sustainable water resources management framework	<ul style="list-style-type: none"> <li>▪ % increase in value of crop production per unit of irrigation water supply</li> <li>▪ increase in area under micro-irrigation</li> <li>▪ % increase in area under high value crop</li> <li>▪ % increase in targeted farmers' incomes compared to other (WOP) farmers</li> <li>▪ Enhanced sustainable water resources planning capacity</li> </ul>	<ul style="list-style-type: none"> <li>▪ Improved activity and resource management</li> <li>▪ Designing future interventions</li> </ul>
Intermediate Outcomes	Intermediate Outcome Indicators	Use of Intermediate Outcome Monitoring
<p><b><u>Component A: Irrigation systems modernization in a sub-basin framework</u></b></p> <p>Modernized irrigation systems and service delivery and management for tank-based systems (sub-component A1) and canal-based systems (A2)</p>	<ul style="list-style-type: none"> <li>▪ Physical modernization: % of schemes completed within planned time and costs, Tank systems modernized (number &amp; ayacut area)</li> <li>▪ % increase in water availability and conveyance efficiency</li> <li>▪ increase in area fully irrigated</li> <li>▪ Joint preparation and implementation of sub-basin development plans across relevant implementing agencies</li> </ul>	<ul style="list-style-type: none"> <li>▪ Preparation of Development and implementation plans for all sub-basins</li> <li>▪ Adaptive project management</li> <li>▪ Supervision planning</li> <li>▪ Outlining additional needs</li> </ul>
<p><b><u>Component B: Agricultural intensification and diversification</u></b></p> <p>Increased productivity of irrigated agriculture and allied sectors in project sub-basins for tank-based systems (sub-component B1) and canal-based systems (B2)</p>	<ul style="list-style-type: none"> <li>▪ % increase in area under SRI</li> <li>▪ % increase in marketing surplus/commodity arrival to markets</li> <li>▪ Number of market information kiosks</li> <li>▪ increase in crop/animal, and fisheries production</li> <li>▪ % area covered by IPM/INM/Organic farming</li> <li>▪ Number of new agricultural enterprises/Value chains Developed</li> </ul>	<ul style="list-style-type: none"> <li>▪ Adaptive project management (e.g. improved targeting of intensification and diversification efforts)</li> <li>▪ Supervision planning</li> <li>▪ Outlining additional needs</li> </ul>
<p><b><u>Component C: Institutional modernization of irrigated agriculture</u></b></p> <p>Improved institutional capacity for modern irrigation service delivery in the State</p>	<ul style="list-style-type: none"> <li>▪ % staff trained/members of relevant professional associations</li> <li>▪ Number of WUAs set up and trained, and effective</li> <li>▪ Irrigation information management systems set up and functional</li> </ul>	<ul style="list-style-type: none"> <li>▪ Adaptive project management (e.g. Design of training program and better use of information systems; Capacity building for irrigation department staff and WUAs)</li> </ul>
<p><b><u>Component D: Water resource management</u></b></p> <p>Improved institutional arrangements and capacity for sustainable water resources management in the State and selected basins</p>	<ul style="list-style-type: none"> <li>▪ State Water Resources Management Agency created and strengthened</li> <li>▪ Basin Boards set up/strengthened for 3 sub-basins and 1 basin by end of project</li> <li>▪ Improved knowledge base and analytical capacity development and use for water resources management</li> </ul>	<ul style="list-style-type: none"> <li>▪ Adaptive project management</li> <li>▪ Identification of future technical assistance requirements</li> <li>▪ Design of basin management interventions</li> <li>▪ Improve the coordination among all agencies involved in WRM.</li> </ul>
<p><b><u>Component E: Project management support</u></b></p> <p>Satisfactory project coordination and monitoring and evaluation</p>	<ul style="list-style-type: none"> <li>▪ MDPU adequately staffed</li> <li>▪ All sub-basin plans appraised</li> <li>▪ Monitoring reports of satisfactory quality submitted every six months</li> <li>▪ Effective project management (reporting, financial management, procurement, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Adaptive project management</li> <li>▪ Inter-agency coordination</li> </ul>

### Arrangements for results monitoring

Project Outcome Indicators	Baseline	Target Values						Data Collection and Reporting		
		YR1	YR2	YR3	YR4	YR5	YR6	Frequency and Reports	Data Collection Instruments	Responsibility for Data Collection
<ul style="list-style-type: none"> <li>▪ % increase in value of crop production per unit of irrigated water (wrt WOP)</li> </ul>	0%	0%	15%	40%	60%	80%	100%	Annual	Survey	LineDept/ M&E agency/MDPU
<ul style="list-style-type: none"> <li>▪ Increase in area under micro-irrigation</li> </ul>	0 ha	0 ha	20,000 ha	40,000 ha	50,000 ha	75,000 ha	100,000 ha	Annual	Survey	LineDept/ M&E agency/MDPU
<ul style="list-style-type: none"> <li>▪ % increase in area under high value crop (wrt WOP)</li> </ul>	0%	1%	3%	9%	15%	24%	30%	Annual	Survey	LineDept/M&E agency/MDPU
<ul style="list-style-type: none"> <li>▪ % increase in targeted farmers' incomes compared to other (WOP) farmers</li> </ul>	0%	0%	5%	10%	20%	30%	50%	Annual	Survey	External M&E agency/MDPU
<ul style="list-style-type: none"> <li>▪ Joint preparation and implementation of sub-basin development plans across relevant implementing agencies</li> </ul>	9 Sub-basin Plans prepared for YR1	Sub-basin Plans updated/ implemented as scheduled & 17 prepared for YR2	Sub-basin Plans updated/ implemented as scheduled & 37 prepared for YR3	Sub-basin Plans updated/ implemented as scheduled	Sub-basin Plans updated/ implemented as scheduled	Sub-basin Plans updated/ implemented as scheduled	Sub-basin Plans updated/ implemented as scheduled	Annual	Annual Reporting	LineDept/MDPU
<ul style="list-style-type: none"> <li>▪ Enhanced sustainable water resources planning capacity</li> </ul>	State Water Framework and Environmental Plans prepared for most TN Basins; 2 existing Basin Boards	State Water Resources Management Agency (SWaRMA) setup	Knowledge base and stakeholder consultations initiated	Decision Support Systems developed for 2 (sub) basins	Draft Basin Plans for 2 (sub)basins with stakeholder & analytical inputs	Draft plans prepared for 3 sub-basins and 1 basin	At least 3 Sub-basin and 1 Basin Board formed	Annual	Annual Reporting	SWaRMA

<b>Intermediate Outcome Indicators</b>	<b>Baseline</b>	<b>YR1</b>	<b>YR2</b>	<b>YR3</b>	<b>YR4</b>	<b>YR5</b>	<b>YR6</b>	<b>Frequency and Reports</b>	<b>Data Collection Instruments</b>	<b>Responsibility for Data Collection</b>
<u>Irrigation systems modernization in a sub-basin framework</u>										
▪ % of schemes completed within planned time&cost	0%	5%	20%	40%	60%	80%	100%	Half yearly	Report	Line dept/MDPU
▪ Additional tank systems modernized (no. and ha.)	0 tanks (0 ha)	200 tanks (30,000 ha)	500 tanks (70,000 ha)	1,000 tanks (140,000 ha)	2,850 tanks (200,000 ha)	4,200 tanks (300,000 ha)	5,700 tanks (400,000 ha)	Half yearly	Report	WRO/MDPU
▪ % increase in conveyance efficiency	0%	0%	5%	10%	15%	20%	25%	Half yearly	Report	Line dept/MDPU
▪ % increase in area fully irrigated	0%	0%	8%	15%	20%	30%	40%	Annual	Report	Line dept/MDPU
▪ Integration of the work of different line agencies for selected sub-basins	9 integrated sub-basin plans drafted	9 integrated sub-basin plans finalized	17 integrated sub-basin plans drafted (9 updated)	37 integrated sub-basin plans drafted (26 updated)	63 integrated sub-basin plans updated	63 integrated sub-basin plans updated	63 sub-basin plans updated & 63 sub-basin ICRs completed	Half yearly	Report	Line depts/MDPU
<u>Agricultural intensification and diversification</u>										
▪ increase in crop/animal, and fisheries production	'000 tons/yr 0 Crops 0 Milk 0 Fish	0 Crops 0 Milk 0 Fish	500 Crops 50 Milk 2 Fish	1,500 Crops 200 Milk 10 Fish	2,000 Crops 300 Milk 15 Fish	3,000 Crops 450 Milk 20 Fish	4,000 Crops 590 Milk 25 Fish	Annual	Survey	Line dept/M&E agency/MDPU
▪ % increase in area covered by IPM/INM/Organic farming	0%	0%	2%	5%	10%	15%	25%	Annual	Survey	Line dept/M&E agency/MDPU
▪ % increase in value of marketing surplus/commodity arrival to markets	0%	5%	10%	30%	45%	60%	75%	Half-Yearly	Marketing data/Reports	Line dept/M&E Agency/MDPU
▪ Number of market information kiosks	0	0	20	50	100	150	200	Annual	Project Reports	Line dept/M&E Agency/MDPU
▪ Number of additional agricultural enterprises/value chains developed	0 enterprises 0 Value chains	To be determined (tbd)	tbd	tbd	tbd	tbd	tbd	Annual	Survey	Line dept/M&E Agency/MDPU

<b>Intermediate Outcome Indicators</b>	<b>Baseline</b>	<b>YR1</b>	<b>YR2</b>	<b>YR3</b>	<b>YR4</b>	<b>YR5</b>	<b>YR6</b>	<b>Frequency and Reports</b>	<b>Data Collection Instruments</b>	<b>Responsibility for Data Collection</b>
<u>Institutional modernization of irrigated agriculture</u> <ul style="list-style-type: none"> <li>▪ % of targeted staff trained/members of professional associations</li> <li>▪ Number of WUAs set up, trained, and effective</li> <li>▪ Irrigation information management systems set up and functional</li> </ul>	Fragmented training	10% (& training cell setup in WRO)	30%	50%	65%	80%	100%	Annual	Report	MDPU/LineDept
	WUAs set up only in 2 sub-basins among the 63 project sub-basins	Preparation for WUA setup; elections	500 additional WUAs set up in project sub-basins	1000 additional WUAs set up in project sub-basins	2000 additional WUAs set up in project sub-basins	2500 additional WUAs set up in project sub-basins	2500 additional WUAs set up in project sub-basins	Annual	Report	MDPU/WRO
	No Irrigation IMS	IMS inception	IMS designed; data input initiated	IMS piloted	IMS deployed	IMS tested	IMS fully operational; 25% of staff able to use IMS	Annual	Report	MDPU/WRO
<u>Water resource management</u> <ul style="list-style-type: none"> <li>▪ State Water Resources Management Agency created and strengthened</li> <li>▪ Basin Boards set up and strengthened for 4 additional basins</li> <li>▪ Improved knowledge base and analytical capacity development &amp; use for IWRM</li> </ul>	Institute for Water Studies and State Surface and GW data center in place	State Water Resources Management Agency (SWaRMA) created		SWaRMA powers defined			SWaRMA, Basin Boards, and the analytical/structured stakeholder processes setup are best-practice for sustainable water resources planning in India	Annual	Report	SWaRMA/MDPU
	Basin Boards setup for Palar/Thambiraparani basins	Stakeholder consultation in 2 other (sub)basins		Stakeholder consultations in 4 (sub) basins	Basin Plans developed for 3 (sub) basins	Integrated plans developed for at least 3 sub-basins and 1 basin		Annual	Report	SWaRMA/MDPU
	Initial GIS data collected for all basins; fragmented modeling capacity	Basin Atlas /State of basin report concept and pilots for 2 basins	Basin Atlases developed for 6 Basins		Strategic Social & Environment Assessments and DSS developed for 3 (sub) basins			At least 3 Sub-basin & 1 Basin Board setup	Annual	Report

<b>Intermediate Outcome Indicators</b>	<b>Baseline</b>	<b>YR1</b>	<b>YR2</b>	<b>YR3</b>	<b>YR4</b>	<b>YR5</b>	<b>YR6</b>	<b>Frequency and Reports</b>	<b>Data Collection Instruments</b>	<b>Responsibility for Data Collection</b>	
<u>Project management support</u>											
<ul style="list-style-type: none"> <li>▪ Multi-Disciplinary Project unit adequately staffed</li> </ul>	MDPU setup with core staff	MDPU fully staffed	Annual	Reports	MDPU						
<ul style="list-style-type: none"> <li>▪ All sub-basin plans appraised</li> </ul>	9 first-year sub-basin plans appraised	17 sub-basin plans fully appraised	37 sub-basin plans fully appraised	Updated sub-basin plans managed for quality	Half Yearly	Reports	MDPU				
<ul style="list-style-type: none"> <li>▪ Project monitoring reports of satisfactory quality submitted every six months</li> </ul>	No project reports	Quarterly progress reports and semi-annual monitoring reports prepared	Quarterly progress reports and semi-annual monitoring reports prepared	Quarterly progress reports and semi-annual monitoring reports prepared	Quarterly progress reports and semi-annual monitoring reports prepared	Quarterly progress reports and semi-annual monitoring reports prepared	Quarterly progress reports and semi-annual monitoring reports prepared	Quarterly progress reports and semi-annual monitoring reports prepared	Quarterly and Half yearly	Reports	MDPU
<ul style="list-style-type: none"> <li>▪ Effective project management (reporting, financial management, procurement, etc.)</li> </ul>	Project Director in place	Project director in place with timely project management and quality oversight by MDPU	Project director in place with timely project management and quality oversight by MDPU	Project director in place with timely project management and quality oversight by MDPU	Project director in place with timely project management and quality oversight by MDPU	Project director in place with timely project management and quality oversight by MDPU	Project director in place with timely project management and quality oversight by MDPU	Project director in place with timely project management and quality oversight by MDPU	Annual	Reports	MDPU

## Monitoring and Evaluation

### *Overall Framework*

The main emphasis of the project M&E system will be to fully monitor and evaluate project activities in a timely manner in order to (i) track project activities progress, (ii) identify what is working well and what is not and help adaptive management during the course of implementation, (iii) evaluate the performance of various institutions (e.g. of WUAs, departments, units, etc.) and (iv) estimate project impacts and results on -the-ground. M&E mechanisms will emphasize stakeholder participation and will be designed to facilitate rapid identification of shortcomings and problem areas and facilitate mid-term corrections, where necessary, to project design and/or implementation arrangements to ensure that the project meets its development objective.

### *M&E by implementing agencies and project stakeholders*

M&E will be undertaken in parallel by various entities. First, various implementing agencies (line departments) and the MDPU will regularly monitor and report the physical and financial inputs and outputs of project activities. To facilitate this, MDPU will employ a senior full-time M&E officer, and have in-place a computerized monitoring information system to consolidate and manage data received from the various implementing agencies, and to collect its own data. Data will be used to update the key performance indicators of the project to input into the quarterly, semi-annual, and annual progress reports. Use of modern information tools (GIS, spreadsheets, etc.) will help collate, compare, analyze, and visualize the information. At the sub-basin level, MDPU will coordinate with the sub-basin committees in monitoring local activities. The involvement of project beneficiaries, more precisely the WUAs, will also be explored in monitoring and reporting activities at the local level. The WUAs will be trained to use simple monitoring tools (e.g. logbooks, maps) to monitor project progress and impacts and discuss implications.

### *M&E by an external agency*

The project will enlist the services of an independent external M&E agency for the duration of the project, to monitor the progress of project activities, and carry out periodic impact evaluations at various intervals (annually, mid-term, end of the project). The M&E agency will prepare and undertake a baseline survey with collaboration of the line departments, collect data on the key project indicators using agreed upon (with MDPU) statistical sampling from basins and districts under the project, design and implement a web-based project monitoring system, and assist with documentation for project reporting and lessons learned. Terms of reference for the M&E agency (including the questionnaire and formats of the baseline surveys) will be prepared, and procurement initiated for the M&E agency to be in place early in the first year of project implementation.

### *Baseline and other periodic surveys*

The Baseline for the project will be developed by MDPU with inputs from surveys and analysis from the M&E Agency. Some of the more challenging indicators used (e.g. increase in farmer incomes) will be gathered from survey data and refined as necessary during the early stages of the project. The focus will be on tracking the indicators specified in this Annex. Periodic surveys will also be carried out throughout project implementation and post project completion in the same areas and if possible with the same households to allow for an accurate evaluation of project

impacts on targeted beneficiaries. To enable comparative assessment of a with/without project situation, as opposed to the more standard before/after project situation, the impact assessments and analyses will collect and use statistically robust comparable data from selected non-project areas also. Preparation of evaluation studies for different components will be an ongoing process resulting in a mid term review, and a final project completion review.

### *Reporting*

MDPU will furnish to the Bank half yearly progress reports. These will include: (a) up-to-date physical and financial expenditure data compared to annual and end-project targets; (b) updated indicators of project performance compared to annual and end-project targets; (c) successes and problems encountered during the reporting period, with suggested remedial actions, and; (d) socio-economic and environmental impacts of the project. In addition, the Project's Annual Work Program to be financed under the project will be prepared and submitted for Bank review and comments prior to the upcoming fiscal year.

The M&E agency will submit: (i) brief monthly and quarterly reports summarizing concurrent monitoring observations to the MDPU and respective implementing departments; (ii) half yearly reports summarizing project M&E of preceding six months, cross-cutting issues and recommendations, and updated project indicators and; (iii) three comprehensive reports - the baseline survey and the main impact evaluation assessments at the time of the project mid-term reviews and project completion.

The reports will be designed to follow a clear, logical format with supporting graphics (charts and GIS maps). The reports will be submitted in hardcopy as well as in electronic form to facilitate further analysis and dissemination. The reports will also be accessible in the web-based project monitoring system. The reports will be discussed at the MDPU on a monthly basis with all relevant line agencies present. Quarterly and semi-annual workshops will be held to discuss the monitoring observations at a higher administrative level in order to facilitate any adaptive management decisions required.

In addition to such M&E reporting, the project proposes to have an Implementation Completion Report (ICR) developed for each sub-basin to facilitate faster transfer of lessons learned during implementation. The preparation of these sub-basin ICRs will be coordinated by MDPU with inputs from the line agencies and the M&E agency. In addition to regular six-monthly implementation support missions, the project will also have a formal mid-term review in September, 2009.

## Annex 4: Detailed Project Description

### INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project

#### Introduction and Overview of the Project

Improving irrigated agriculture productivity depends upon improving water availability and water use. The project design is therefore based on the following components:

- A. improving irrigation system performance at the bulk level, i.e, diversion weirs, *anicuts*, supply channels, tank storages, tank bunds, spill weirs and sluices, main canals, branch canals, distributaries and minors;
- B. promoting the use of water saving on-farm irrigation technologies and of agricultural intensification and diversification efforts in response to market demands and agri-business opportunities
- C. strengthening the institutional capacity for irrigation management at the state and the water user level
- D. strengthening water resource management
- E. project management support

**Components A and B:** The project will finance the restoration, revival and modernization of selected existing irrigation infrastructure in the State. The irrigated area covered under the project will be about 617,000 ha out of a total irrigated area of about 2,100,000ha, and is spread over seventeen major basins. The seventeen basins have been divided into 127 sub-basins. The basins and their associated sub-basins are shown in Maps 1& 2 at the end of this document. Irrigated areas in the Cauvery basin covering about 800,000 ha are not included under this project since there is a tribunal process under way for the sharing of waters amongst the riparian states.

Investments were done in several of these sub-basins under the Bank-financed Tamil Nadu Water Resources Consolidation Project (WRCP) which closed in September 2004. Under the current investment, those sub-basins in which no activities were carried out under the WRCP are to be taken up. In addition some sub-basins where only a small amount of work was carried out under the WRCP will also be taken up. An exception was made for the Aliyar and Palar (Coimbatore) subbasins in view of their unique water allocation practices, and the need to modernize their canal system serving about 170,000 ha to improve water use efficiencies and increase its agricultural productivity.

Details of the sub-basins proposed to be taken up under this investment together with their potential irrigation areas and their proposed phasing over the project years, as well as detailed maps showing the location of the various project activities are on file.

For each sub-basin, a sub-basin development plan will be prepared in a participatory manner. This plan will encompass activities to improve bulk water delivery systems; support to the introduction of water saving irrigation technologies (e.g., drip and low pressure sprinklers); programs for intensification and diversification of agriculture and horticulture; interventions to support animal husbandry and fisheries; activities to strengthen market access and market information systems; and support to the development of agro-industries. Detailed sub-basin development plans have been prepared through interaction of line agencies, farmers and other stakeholders for nine sub-basins covering about 323,000 ha. With the leadership of the executive engineer of each sub-basin, these plans have been translated into investment activities and development targets for each line agency.

While the bulk water delivery efforts, by their nature, have a top-down character, the agricultural development and water saving activities will be farmer-centered and farmer driven. The water users associations that are or will be established under the gamut of the Tamil Nadu Farmers' Management of Irrigation Systems Act (TNFMIS) would be the drivers of agricultural development and water saving activities at the sub-basin level. About 2,500 WUAs will be established through the electoral process under the TN FMIS Act. WUAs would be grouped in Clusters of WUAs (CWUA), based on experiences in existing WUAs in the project area. Each CWUA will be equipped with a kiosk with full internet connectivity in order to exchange information about water management performance, to obtain market information, and to receive information and distance training on new production technologies.

The sub-basin development plans that guide activities in component A and B will be updated annually. Sustaining these efforts would require upgrading of the technical and managerial skills of the Water Resources Organization and the other implementing agencies – agriculture, horticulture, agricultural engineering, animal husbandry, and fisheries.

**Component C:** The PWD has been bifurcated into the Water Resources Organization (WRO) and Buildings Organization. The WRO will be supported with a state-wide information management system and training for its officers in the design, construction and management of irrigation infrastructure using modern techniques and approaches.

The Government of Tamil Nadu enacted the “Tamil Nadu Farmer Management of Irrigation Systems Act” in 2000 to effectively decentralize irrigation service delivery and improve participation of farmers in irrigation management. This Act was notified across 20 districts of the State (excluding the Cauvery basin and 2 districts of Chennai and Nilgiris with no surface irrigated command areas) in the year 2002 and notified and implemented in approximately 0.6 million hectares covered by the Tamil Nadu Water Resources Consolidation Project (TNWRCP). The TNFMIS Act provides for constitution of Water User Associations (WUA), Distributary Committees (DC) and Project Committees (PC) of farmers in the command area of irrigation systems (including system tanks) at the primary, secondary and tertiary levels that work in partnership with Water Resource Organization officials designated as “competent authority” at each of these levels. While the Act has been implemented in around a third of the surface irrigation command area of the State, it has to be now strengthened and rolled out state-wide. This process of irrigation management transfer is at an early stage in Tamil Nadu with the setting up of around 1566 WUAs thus far through formal elections as required under the Act. An additional about 2500 WUAs will be set up to cover surface irrigated areas in about 50 out of the 63 sub-basins to be taken up under the project. Establishment of WUAs in the remaining 13 sub-basins has been covered under the previous Bank-financed WRCP. The existing associations in their formative stages need considerable training and capacity building to manage irrigation systems in partnership with WRO officials who are also beginning to grapple with their roles and responsibilities as competent authorities.

Project component C will support the technical and managerial upgrading of the WRO, including modern information systems and connectivity, as well as the formation and capacity building of WUAs. Limited hardware and software support to other participating agencies will be made available in order to bring their skills to the required level to implement the project.

**Component D:** As described in the Bank's Principles of Engagement in Irrigation in India, support will be provided to establish/strengthen/consolidate resource management institutions in the State. This is also in line with the approach paper to the eleventh five year plan of the State. Decentralized resource management activities will be supported at the sub-basin and Basin levels through appropriate mechanisms. Project component D has been designed to initiate the handling of resource management issues in a scientific manner.

**Component E:** A multi-disciplinary project such as this needs substantial coordination and monitoring and evaluation of project activities in a continuous manner. This is to be achieved by the Multi-Disciplinary Project Unit (MDPU) established for this purpose. Project component E is designed to support the work of the MDPU.

The project components are described in further detail below.

**Component A: Irrigation systems modernization in a sub-basin framework**  
(Base Cost US\$282.83 million)

Under this component, improvements to irrigation delivery infrastructure by the WRO in the sub-basins in accordance with the sub-basin development plans developed in a participatory manner by the implementing agencies and the farmers will be supported.

Sub-component A1: Tank Systems (Base Cost US\$241.28 million)

These tanks (small traditional water bodies) receive water from their own catchments and, in some cases, augmented by diversions from a nearby river through a system of diversion weirs (known as *anicuts*) and supply channels. In about 61 sub-basins, the irrigation infrastructure to be modernized involves such tank systems. These tanks then supply water to associated irrigation commands. Some supply channels also supply water directly to irrigation commands known as Direct *Ayacuts*. If a tank receives water from a river which is regulated through dams, then the tank is called a system tank. If the river is not regulated and the tank receives water from the unregulated river through diversion weirs and supply channels, then the tank is termed a non-system tank. If the tank does not receive any supplementary water from a river source and receives water from only its own catchment then the tank is called a rain-fed tank. Rainfed tanks may be owned and operated by the Public Works Department (PWD) or the Panchayat Unions (PU). Under the project all PWD tanks located in the selected sub-basins are included. The Panchayat Union tanks have not been included due to lack of agreement to the formation of the WUAs in such tanks, which is a pre-requisite for inclusion in this project. Farmers associated with Panchayat Union tanks will be taken to visit completed tanks to enhance cross-learning on the benefits of such tank modernization, and explore their demand for such activities.

The Ministry of Water Resources, Government of India, has prepared a “National Framework for State Projects to be Posed for World Bank Assistance.” The framework advocates a basin approach, hydrological scrutiny, using participatory and demand-driven approaches (with broad community participation intermediated by NGO/CSO and multi-disciplinary teams, community contribution, capacity-building and training, using an MOU clearly outlining the roles and responsibilities of various actors), establishment of forward market linkages, improvement of agricultural productivity (through intensification and diversification of agriculture, and fisheries development), and creation of enabling environment for effective implementation (including focused institutional arrangements, comprehensive knowledge base, and effective monitoring of project results). The design of the IAMWARM project reflects this framework in supporting tank-related investments.

For the restoration and revival of the systems under this sub-component, funds will be provided for the modernization of the *anicuts* (diversion weirs), associated supply channels, desilting of tanks where required based on previous hydrological performance, strengthening and upgradation of the tank bunds (embankments), and repairs, renovation and modernization of sluices and surplusing arrangements. In the case of rain-fed tanks all the above measures excluding those related to diversion weirs and supply channels will be supported.

Sub-component A2: Other Irrigation Systems (Base Cost US\$ 41.55 million)

There are a few sub-basins where the irrigation infrastructure has only canal systems that are not inter-woven with the tank systems. The modernization of irrigation commands on two of these sub-basins following the development of sub-basin plans with both community and analytical input would be supported under this project.

In these two sub-basins a large canal system has been developed. The system comprises seven reservoirs and has both hydropower and irrigation infrastructure. The reservoirs lie at various elevations ranging from 1146 msl to 320 msl and this difference in elevation is utilized to develop hydropower totaling 185 MW. This is a unique project wherein irrigation is provided now to about 170,660 ha through a four-zone system with each zone receiving irrigation water once in two years. Farmers have developed groundwater to cater to their needs during the non-entitlement period. Coconut is the major crop. Irrigation under this project is mainly for dry crops with about 20% for wet crops grown in seepage-affected low-lying pockets. The system has been in operation for over fifty years now and is in need of repair and modernization. Under the proposed investment, funds will be provided for: (i) rehabilitation and modernization of control structures; (ii) rehabilitation of cross-masonry structures; (iii) construction of inlets; (iv) standardizing canal banks and canal bank roads; (v) lining the beds and sides of the canal network as required; (vi) construction of modern flow measurement structures at each branch canal, distributary and minor offtakes; (vii) provision of real-time data acquisition system and canal operation mechanisms; and (viii) provision for equipment needed for automated canal operation to improve performance efficiency.

Detailed designs have been completed and bid documents have been prepared for about US\$ 90 million for the civil works covering about 300,000 ha. Associated procurement packages and procurement plans have been developed. Tenders will be called immediately after negotiations and the actual awards are expected to be made no later than end-April 2007 so that the ensuing construction season could be utilized.

The WUAs will be asked to contribute a certain amount and a matching amount will be provided by the project. This amount will be kept in a fixed deposit and the interest derived will be used for specific routine maintenance works assigned to the WUAs under a Memorandum of Understanding. For the remaining O&M, a study will be carried out to determine the exact O&M requirements tank by tank and the GoTN will ensure specified separate allocation each year in the State Budget under the head of O&M for each sub-basin. Agreement on this aspect is reflected in the minutes of negotiations.

**Component B: Agricultural Intensification and Diversification**

**(Base Cost US\$166.23 million)**

Under this component, support will be provided to enable the farming community to achieve increased levels of intensification and diversification. This Component would consist of the following two sub-components:

Sub-Component B1: Tank Systems (Base Cost US\$117.18). This sub-component will focus on intensification and diversification of tank-dependent ayacuts.

Sub-Component B2: Other Systems (Base Cost US\$49.05). This sub-component will focus on the intensification and diversification of the larger canal-irrigated systems.

In consultation with the farm community (where possible as organized in WUAs, their clusters and their federations) and with the participation of the different line departments, agricultural

development plans and annual work plans are prepared at the sub-basin level for both these sub-components. The sub-basin agricultural development plan will be prepared under the leadership of the sub-basin executive engineer, in coordination with the Agricultural Technology Management Agencies (ATMAs) that are currently being rolled out by the Government of Tamil Nadu. Agricultural development plans will focus on the key constraints and opportunities that have been identified by the farm community in interaction with the line agencies, and will cover all the activities required to overcome those constraints or use those opportunities (convergence of activities). This will require the intense collaboration among line departments, to identify proper market opportunities, develop adequate processing and marketing systems, test and disseminate the required production and water use technologies and ensure that private sector input suppliers are engaged.

Under the guidance of the Executive Engineer intensification and diversification targets will be established for each sub-basin and will be shared with the MDPU. Once plans have been approved (see Annex 6), they will be implemented by each of the line agencies in collaboration with the Water User Associations or other farmer groups. Scorecards will then be put in place to measure the performance of each sub-basin and to guide budget allocation through the course of the project. Since actual budgets by sub-basin and line departments depend on the implementation progress, the budgets estimated for each line department are indicative only. Below the role of each line department in implementing component B is further elaborated below.

#### **Department of Agriculture (Base Cost US\$21.79 million)**

During the course of the development of the nine sub-basin development plans, the following main concerns were identified: farmers prefer low input-low profit crops with high water consumption; the adoption of INM, IPNM, and new production technologies is low. To resolve these and to meet the requirements of the sub-basin development plans, crop demonstrations will be conducted in farmers' fields chosen by each WUA. Crops chosen for demonstration will vary depending on farmer consultation. Based on the nine sub-basin data, crops chosen for demonstration would certainly include paddy, maize, cotton, pulses, ground nut and coconut. The demonstrations will be designed to engage as many members as possible of each WUA and spread awareness, for example, by locating demonstrations on large areas (as compared to the current very small field experiments) at head, middle and tail ends of the WUA and by organizing participatory monitoring and evaluation of the demonstrations. While occasionally the demonstrated technology may be immediately applicable, it is expected that in many cases, two or three rounds of adaptation may be required to arrive at a feasible cropping system.

Funds will be provided to the agriculture department to cover the material and incidental costs of demonstrations such as seeds, hybrid seeds, bio-fertilizers, micro-nutrient mixtures and other inputs required when procured in accordance with Bank guidelines. In addition support will be provided for INM, IPNM and organic farming techniques demonstrations in each WUA. Support will be provided for required training of department personnel on new techniques, new varieties and participatory experimentation and adaptation.

#### **Department of Horticulture (Base Cost US\$ 16.17 million)**

Diversification to high value horticulture crops is being promoted by the GoI and GoTN. At present in the project sub-basins, farmers grow low-yielding varieties using conventional planting methods and traditional irrigation technologies. In addition, poor post harvest technologies result in low prices. The interventions by the Horticulture Department will be oriented towards the introduction of new crops and the adoption of new technologies by farmers, thereby increasing

the area under horticulture as identified in each sub-basin development plan. Plant varieties and production technologies will be defined for each sub-basin in participatory demonstrations. The activities of the Department of Horticulture will be strongly linked with those of the Agricultural Marketing Department, since market opportunities and constraints tend to define the feasibility of horticulture more than mere production conditions.

Funds will be provided to the horticulture department to carry out these demonstrations, when procured according to Bank guidelines. Demonstrations in mango, *sapota*, *amla*, tissue culture banana, chillies, herbs, spices, hybrid watermelon, hybrid *bhindi*, and hybrid tomato are a few possibilities. Funds will be provided for INM/IPNM and organic farming demonstrations in each sub-basin. Synergy with the activities of the National Horticulture mission would be maintained. Project support will be oriented to complement the activities of the NHM.

#### **Department of Agricultural Engineering** (Base Cost US\$75.40 million)

On-farm water use in Tamil Nadu is often not very efficient, due to poor application management and low conveyance efficiency. Also water may not be available during critical production stages. It is also increasingly clear that labor availability in Tamil Nadu agriculture is rapidly changing.

Interventions from the agricultural engineering department will be oriented to up-scale the adoption of drip and low pressure sprinkler technologies according to the sub-basin development plans. It is estimated that about 21,500 ha of coconut, 23,300 ha of sugarcane and 22,200 ha of fruits and vegetables could be brought under drip fertigation in the 63 sub-basins. In addition, low pressure sprinklers would be employed for groundnuts and about . At the end of the project period approximately 100,000 hectares will be targeted to be under drip and sprinkler systems. In selected commands where the WUAs express interest, HDPE pipe distribution systems will be installed. In all commands, motors required to pressurize surface flows to accommodate drip systems and low pressure sprinklers for specific crops will be supported. Farm ponds will be installed in each WUA to demonstrate its positive effects on fish production and water availability at critical production stages.

Funds will be provided to expand to other areas, and follow the pattern of, the existing GoI scheme (where the farmer pays 50% of the cost and the Government the rest) to support the purchase and installation of drip and sprinkler systems. Funds will also be provided to support the purchase of farm machinery by WUAs and to install farm ponds.

The existing incentive systems provided by GoI and GoTN will be maintained and where needed further incentives will be provided to accelerate the installation of appropriate modern on-farm technologies including solar panels. The staff of the agricultural engineering department will be provided with modern design tools and with training in advanced irrigation technologies.

#### **Department of Agricultural Marketing** (Base Cost US\$5.52 million)

Agricultural marketing in Tamil Nadu (as in many other states) is characterized by cycles of occasional gluts and shortages. For most farmers, market access is not assured, quality standards are absent and as a result their bargaining position is poor. Farmers also have limited access to market information.

Under this project, the department of Agricultural Marketing will support farmers and WUAs in strengthening their market orientation. The work on market information and intelligence will create an understanding of the market, with particular focus on products with strong market

opportunities, profitable production and high returns per unit of water. An overview of the market and its prospects in Tamil Nadu will be made, and subsequently a limited range of enterprises will be selected and presented to farmers as options for diversification. Strategies for each of the selected products will be developed covering; market linkages, sources of key inputs and profitable production. Likely enterprises are maize, groundnuts, vegetables, bananas, dairy, aquaculture and chilies. Linkages with the agribusiness sector will be established. At the same time WUAs will be provided with internet access so that groups can access market intelligence information (product profiles, contacts of potential trading partners), technical information (production information, irrigation suppliers) and the on-line market information.

The project will encourage diversification and intensification by working with the WUAs. The process will be piloted during the first two years of the project in the area where WUAs are already in place. Farmers will be taken through a process of self-discovery of the profitable diversification and intensification options, based on a menu of likely enterprises generated in the sub-basin development plans. The outcome of this process will be action plans for support from service providers during the diversification process and may include investment in shared market infrastructure. These service providers will include specialists from line Departments, TNAU, NGOs/CSOs, and the private sector. During the pilot phase this work will be carried out by the Projects Diversification Adviser, located within the MDPU and a marketing Specialist, located in a cell in the Agricultural Marketing Department. The activities of the Department of Agricultural Marketing will be closely coordinated with the more production-oriented departments such as Agriculture and Horticulture.

Funds will be made available to support the development of market intelligence and information systems and to put in place the self-discovery process. The project will also support the investment in shared marketing facilities, particularly those that contribute to the success of diversification and income generation. The investment will be driven by the needs of the WUA. These will include collection centers, scales, quality measuring equipment, grading equipment, storage, information and communication, equipment which improves quality and product hygiene.

#### **Tamil Nadu Agriculture University (TNAU) (Base Cost US\$ 19.76 million)**

Many water saving and other agricultural technologies are coming available globally but have not been widely tested and disseminated in Tamil Nadu. TNAU will work under a performance-based memorandum of understanding signed with MDPU on issues related to promoting water saving technologies such as SRI in paddy; drip and sprinkler technologies in field and horticulture crops for large scale adoption; and selected diversification options. TNAU will work in convergence with other line departments including WRO. Most of TNAU's activities will be in mission mode, working towards large scale coverage of specific technologies – SRI in Rice (given that water-intensive paddy is the dominant crop in this water-scarce state), drip fertigation in sugarcane, coconut, banana, cotton and vegetables, price forecasting and market intelligence, and popularization of labor saving implements in rice, groundnut and maize. A smaller part of the work will be to test and adapt technologies developed on-station (maize, gingelly, castor, casuarinas, groundnut, vegetables and integrated farming systems) to farm conditions. The seed village concept will be supported to produce and supply quality seed and seedlings for more diversified agriculture. TNAU will also provide necessary training through its various centers to the farmers and other stakeholders.

Funds will be provided to the TNAU to work on SRI for paddy (including research and development of farm machinery for transplanting), micro-irrigation: drip fertigation for Banana, Coconut, Cotton, Sugarcane, Vegetables and fruit crops, IPM, IPNM for major crops such as Rice, Sugarcane, Groundnut, Integrated Farming System, diversification with maize and vegetables, post harvest technologies for value addition, demonstration of production technologies in farmers' fields for hybrid cotton, pulses, maize and oilseeds, saucer planting for Casuarina and imparting training on improved water related and crop related technologies to the stakeholders.

**Department of Animal Husbandry** (Base Cost US\$8.73 million)

Animal husbandry contributes significantly to the income of small and marginal farmers, along with landless laborers many of whom are women who play a major role in the care of livestock. The contribution of the sector to the food basket in the form of milk, eggs and meat has been impressive in fulfilling the animal protein requirement of a growing human population. Feed and fodder are the major limiting factors in enhancing farm animal productivity which is low by national and international standards. Another limiting factor for livestock development is the low level of artificial insemination to improve the genetic breed of animals and the prevalence of endemic livestock diseases. The success of the livestock interventions depends on effective dissemination of information to the field to improve the knowledge level of the farmers regarding the best and latest animal husbandry practices, emerging new diseases and their control, and optimum utilization of fodder resources.

The main objective of this sub component will be to improve the production potential of livestock in the sub-basins through (i) increasing availability of green and other fodder by bringing more area under fodder cultivation; (ii) improving delivery of veterinary services; (iii) improving awareness and knowledge levels of farmers in the sub-basins including market intelligence and tie-ups.

Funding will be provided for on-farm demonstrations of fodder production through provision of certified seeds in selected demonstration plots of willing farmers for grasses like Co3, Kollukattai and Stylo, in addition to support for Maize and Chulam. It is estimated that approximately 6,500 ha is expected to be brought under fodder cultivation; improving the delivery of veterinary services will be addressed through private sector participation.

The project will support the improvement of veterinary services by encouraging entrepreneurship among unemployed veterinarians. The veterinarians will practice from the Cluster WUA building - hereafter referred to as the CWUA Veterinary Unit (CWUAVU), and will charge the farmers for services rendered. Each CWUAV will be mobile and will visit the farmers on a pre-arranged and agreed schedule to provide veterinary services like vaccination, de-worming, castration and treatment and breeding support like AI and pregnancy diagnosis. Support will be provided to each CWUAVU to obtain LN<sub>2</sub> containers, artificial insemination guns, thawing flasks, straw cutters, microscopes, centrifuges, minerals and vitamins supplements. These will be under the management of the CWUAV. The Animal Husbandry Department will ensure supply of required consumables for AI and required vaccinations.

Outreach programs will be supported on: (i) infertility cum total veterinary health care camps; (ii) distribution of mineral mixture; and (iii) distribution of awareness materials in the information, education and communications campaigns.

### **Department of Fisheries (Base Cost US\$3.85 million)**

The major concerns in fisheries are non-availability of carp seeds, insufficient rearing and storage space and low income from aquaculture in traditional water bodies. Under this component, funds will be provided to address these issues as identified in each sub-basin development plan. Fish seed banks will be supported which shall be owned and operated by WUA or members of Fishermen Co-operative society in order to improve the availability of quality carp seeds in the sub-basins. Fish seed rearing in net cages will be introduced in 10 units that will be operated and managed by WUAs or Fishermen Co-operative Societies. In cooperation with the Agricultural Engineering Department, demonstration farm ponds of 0.1 ha water-spread area will be provided at the rate of one per WUA, where intensive aquaculture will be promoted by providing inputs such as seed and feed etc. In addition, support will be provided for fisherfolk to get the necessary fishing gear to harvest the additional production envisaged under project intervention. Training and capacity building will also be supported to overcome the knowledge and skills deficits in most WUAs on aquaculture.

### **Agri-business Development Facility (Base Cost US\$15 million)**

The project aims at developing and strengthening the small and medium size agro-entrepreneurs in TN. An agribusiness development facility (ABDF) will be established for this purpose, with three major areas of focus: (i) increasing access to finance (ii) increasing access to business development services (business incubation) and (iii) improving the business, legal, and regulatory environment. The detailed modalities of ABDF operation will be evolved in the first year of project implementation.

Increasing access to finance will be achieved through the following activities:

- Work with Small and Medium Enterprises (SMEs) on preparing bankable proposals that will increase their likelihood of receiving loans from commercial banks
- Work with local banks to gather information about the scale of agricultural lending in TN, understand their lending terms and relay the information to potential agro-entrepreneurs. Also, if needed, assist local banks through training on agricultural lending and help alleviate some of the bottlenecks they face in this respect.
- Catalogue all available state and centrally sponsored schemes that are available for post-harvest and value addition investments (including NHM, NABARD, and other schemes), and provide assistance (a one stop shop) to small holders on accessing these schemes.

Increasing access to business development services will be achieved through a combination of vocational training programs, technical assistance and training to SMEs and institutions, strengthening producers and industry associations, provision of marketing extension, IT initiatives and other means of disseminating knowledge, development and training on quality and process standards, Good agricultural practices and Hazard Analysis and Critical Control Point (HACCP), Research and Development (R&D), and technical support on post harvest technologies, and facilitating means of vertical coordination. ABDF will also develop stronger backward and forward linkages within the agro-food systems and the local economy. Linkages between corporate entities and agro-SMEs and producers' groups will be facilitated through formal and informal networking activities. The focus here is on fostering more remunerative and reliable market linkages for small agro-enterprises and in so doing enabling them to benefit from the growing market opportunities in the agro-food system, domestically and internationally.

ABDF will adopt a value chain approach which focuses on addressing market gaps and sub sector constraints from "farm to plate", and design appropriate interventions across the value chain.

ABDF will provide private entrepreneurs with technical assistance for product development, access to technology, packaging, marketing, and other needed services as mentioned in the earlier paragraph in order to improve productivity and competitiveness in selected sub-sectors. To the extent possible these will be developed through private sector service providers and institutions following a service provider-led business model. For training purposes, ABDF will sign MOUs with local universities (institutes), NGOs/CSOs to develop capacity building curricula and delivery mechanisms in the desired area. Where local service providers are not available or would take too long to develop, ABDF could call on national/international expertise.

Enabling business/legal/regulatory environment will imply the modernization of particular laws and regulations (e.g., on food safety, on seed commercialization, on warehousing, etc.) and ensuring that the institutional arrangements—whether in the public or private sectors—for implementing and enforcing those regulations are in place and effective. ABDF will also work with all parties concerned in order to minimize the barriers for agribusiness development arising from the existing regulatory policies and their implementation. ABDF will also work on establishing new and supporting existing business membership organizations to develop their capacity to provide services to their members on a sustainable basis, with the aim at improving SMEs' business environment. ABDF will work with local institutions to collect data on the agribusiness sector in order to better understand its characteristics and constraints and monitor its development.

**Component C: Institutional Modernization for Irrigated Agriculture**  
(Base Cost US\$52.69 million)

Under this component funds will be provided to assist GoTN in achieving their vision to have modern, lean, financially sustainable institutions with appropriate human resources and skills -mix, knowledge-base, and analytical tools to deliver efficient environmentally and socially sustainable and cost-effective irrigation services to farmers via water users associations, and other public-private partnerships. Funds will also be provided to assist in the formation and capacity building of water users associations in the 63 sub-basins under the project.

The Public Works Department has been restructured to form a specialized irrigation organization. Senior engineers will be re-assigned and some of the positions will be consolidated to make it a more meaningful and functional organization. Modernization of this newly-created organization will be carried out through (a) support for computerization with network connectivity for all the offices of the WRO; (b) training of engineers in computer-aided designs and construction management; (c) implementation of enterprise-wide information management system; (d) LAN and Wan connectivity; (e) provision of consultant and training support and funding of staff salaries and allowances for incremental specialist positions required for the Information Technology, Participatory Irrigation Management and Training cells being set up in the Engineer-in-Chief's office; (f) provision of modern equipment (survey, design, communications, data acquisition, storage, processing and analysis, computer hardware and software, internet access), vehicles and infrastructure; (g) support for formal courses and study tours in addition to in-house training and seminars conducted by invited national and international experts; and (h) creation of modern technical, financial, and operational management capacity using computer-based MIS. Life memberships in appropriate national and international professional associations such as the Indian Water Resources Society (IWRS), the Institution of Engineers (India), the Indian National Committee for Irrigation and Drainage (INCID), the International Committee on Irrigation and Drainage (ICID), and the International Committee on Large dams (ICOLD) for all staff of the newly created department will be funded with contribution from staff, since lack of exposure to advances in irrigation and drainage operations and management is hampering the activities in this

discipline in the State. The Information Technology component, estimated to cost about US\$ 20 million, will improve and streamline the systems and processes for more efficient operations through a Business Process Improvement and Change management program. The various training programs will cost about US\$ 6 million. All training activities will be coordinated by the Training cell being set up in the E-in-C's office. The cost of operating this cell is included under the training costs above. In addition to the above funds will be provided to engage consultants for (i) topographic and cadastral surveys; (ii) design of systems; (iii) technical examination of works; and (iv) any other special studies that may be identified during the course of implementation. The cost of surveys, system designs, examinations and special studies is estimated at US\$ 7 million.

The tank system in Tamil Nadu is centuries old and there are a number of traditional farmers' associations functioning for over fifty years in some of these tanks. Every effort will be made not to disturb the well-functioning organizations of this type but they will be brought under the gamut of the TNFMIS Act so that they can have the same privileges and responsibilities. The mobilization of the others would follow procedures adopted in the WRCP successfully. The Participatory Irrigation Management Cell being set up in the E-in-C's office will oversee the formation and capacity building of WUAs with assistance from regional Chief Engineers and the other participating agencies.

A cluster of WUAs (about ten hydraulically connected WUAs) referred to as CWUA will be provided with an appropriate building and computer facilities with network connectivity. The traditional method of sending information through these kiosks will be facilitated. More importantly, given the advanced nature of the IT development in Tamil Nadu, it is expected that several CWUAs may run websites of their own wherein they could advertise what they are doing, minutes of their meeting etc., and this is expected to generate healthy competition amongst the WUAs to be recognized by their peers. Support will be provided for any such innovative efforts by the WUAs in addition to the substantial capacity building element. The cost of the PIM sub - component is estimated to be about US\$ 10 million.

Details of the training program for the WRO officers and farmers under PIM are on file. Limited training facilities will be supported for the other participating agencies to improve their technical skills.

An Irrigation Research Fund (IRF) with a corpus of about US\$3 million will be set up in the E-in-C's office and used to foster research in irrigation development and management. The research will be conducted by private sector, academia and department staff on a competitive grant basis.

#### **Component D: Water Resources Management** (Base Cost US\$5 million)

In line with the Bank's Principles of Engagement in Irrigation and Drainage in India and the State Planning Commission's approach paper for the eleventh plan, funds will be provided to establish the State Water Resources Management Agency (SWaRMA). The objective of this Agency is to allocate water efficiently across sectors and to assist in developing and managing the water resources of the State in a holistic way in a riverbasin framework. The SWaRMA will be constituted by amalgamating the existing Institute of Water Studies and the State Surface and Ground Water Data Center. Additional specialists will have to be recruited to represent various water consumers, environment and social aspects, economics, GIS, remote sensing, modeling, communications etc. Funds will be provided to meet incremental staff salaries and allowances on a declining basis to cover the costs of operation of the Agency.

Effective use of Information for Water Resources Planning and Management: The project will build upon various fragmented and inconsistent departmental information systems to create a

shared, synoptic knowledge base for water resources management (with spatial and attribute information on climate, basin/catchment status, water resource systems including tank systems, administration including village-level, water uses, water quality, existing and proposed projects, etc.). It is critical to have appropriate decision support tools and structured stakeholder processes to make use of this knowledge base to build awareness and support shared-vision decision-making on water resources.

Strengthening the Framework for Sustainable Water Resources Management: The State has good elements of water resources management (e.g. State Water Policy, Water Resources Control and Review Council and nine sub-committees, Water Resources Research Fund, Basin Board setup, Groundwater Act, etc.). Over the following months, an appropriate policy framework for effective water resources management could be drafted drawing upon the experiences in the State, in other states in India and in the international arena. These could include a Water Resources Council (updating the mandate and membership of the existing Water Resources Control and Review Council), legislative backing for the State Water Resources Management Agency (to give it appropriate planning and regulatory powers) and Basin Boards (to increase their number and vest them with appropriate powers).

At the basin level, institutions to deal with sustainable water resources management would be established based on lessons from the Palar and Tambaraparani Basin Development and Management Boards established earlier. The operating costs of these Boards will be supported. These agencies will undertake necessary studies and follow-up with investment decisions for rational management of resources.

Funds will be provided to support work on the Cooum sub-basin involving rural-urban interface. There are interesting resource management issues in this basin and resource management will be based on decision support systems to be developed taking into account the various uses for water in the basin, pollution management, and the design of coastal structures to deal with the problems of severe silt deposition due to littoral drift at the mouth of the Cooum into the Bay of Bengal which affects the river flow within the city. Funds will be provided to recruit experts to study the basin as a whole and to arrive at integrated solutions (both structural and non-structural) to bring life back into the river as it passes through the city of Chennai.

The Water Resources Research Fund (WRRF) set up in the IWS under the WRCP will be further supported under this component to be managed by IWS (and later to be managed by SWArMA that would amalgamate IWS) under terms and conditions similar to the earlier fund. The funds will be used to conduct applied research on a competitive grant basis and will be open to all sections of the society.

### **Component E: Project Management Support** (Base Cost US\$ 8.32 million)

Project implementation will be carried out by different line agencies and new institutions to be set up under the project and by public-private partnerships (as described in Annex 6). All these agencies and their activities will be coordinated through the already-established Multi-Disciplinary Project Unit (MDPU). Funds will be provided to the MDPU to assist all implementing agencies in the preparation of high quality sub-basin development plans for the remaining 54 sub-basins. The MDPU is responsible to prepare the annual work plans of all the agencies based on the sub-basin development plans. MDPU is also responsible to furnish to the Bank quarterly progress reports and other financial reports required for reimbursement. The MDPU will guide the participating agencies in Bank procurement procedures. Monitoring and Evaluation (M&E) activities, including baseline surveys, covering all components of the project will be carried out by reputable consulting agencies recruited by the MDPU. Funds will be

provided to MDPU to cover the cost of the M&E Consultancy, as well as for salaries and allowances of all M&E staff positions. In addition support will be provided for the construction of a new building to house MDPU staff and consultants (this building will be combined with the main building to be provided for the Water Resources Organization), necessary computer hardware and software including video-conferencing facilities, library facilities, other minor consultancy inputs that may be required during project implementation, vehicles for staff and consultants (purchase/hire) and all media awareness and related communication assignments.

### Annex 5: Project Costs

#### INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project

<b>Project Cost By Component and/or Activity</b>	<b>Local US \$million</b>	<b>Foreign US \$million</b>	<b>Total US \$million</b>
Irrigation systems modernization in a sub-basin framework	268.00	14.83	282.83
Agricultural Intensification and Diversification	151.19	15.05	166.24
Institutional Modernization for Irrigated Agriculture	37.74	14.95	52.69
Water Resources Management	3.00	2.00	5.00
Project Management Support	5.32	2.90	8.22
<b>Total Baseline Cost</b>	<b>465.25</b>	<b>49.73</b>	<b>514.98</b>
Physical Contingencies	14.88	0.15	15.03
Price Contingencies	35.87	0.12	35.99
<b>Total Project Costs</b>	<b>516.00</b>	<b>50.00</b>	<b>566.00</b>
Interest during construction			
Front-end Fee	0.00	0.00	0.00
<b>Total Financing Required</b>	<b>516.00</b>	<b>50.00</b>	<b>566.00</b>

## **Annex 6: Implementation Arrangements**

### **INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project**

The project will be implemented over a period of six years. The main implementing agencies will be the Water Resources Organization (WRO), Agricultural Engineering, Agriculture, Horticulture, and Agricultural Marketing Departments, Tamil Nadu Agricultural University, and Animal Husbandry and Fisheries Departments, with management support and co-ordination provided by the Multi-Disciplinary Project Unit (MDPU).

The WRO is under the administrative jurisdiction of Secretary PWD. Agricultural Engineering, Agriculture, Horticulture, Agricultural Marketing and Tamil Nadu Agricultural University (TNAU) are under the administrative control of Secretary Agriculture. Animal Husbandry and Fisheries operate under the Secretary Animal Husbandry and Fisheries. Thus all the participating agencies are managed by three Secretaries to Government. The MDPU, headed by the Project Director, is located in the PWD under the administrative control of Secretary PWD.

A Project Steering Committee (PSC) chaired by the Chief Secretary and comprising the Secretaries to Government for Finance, Agriculture, Animal Husbandry & Fisheries with the Secretary Public Works Department as the Member Secretary has been set up which will review the progress of the TN IAM WARM every six months and provide strategic directions, guidance on policy matters and resolve conflicts, if any, amongst the implementing agencies.

The MDPU will have representation in all the disciplines that are part of this innovative project and in procurement and financial management aspects. These would include external specialists and deputed line agency personnel. At present, several specialists deputed by the participating agencies work in the MDPU. Additional specialists in the fields of environment, social development, media and communications, market intelligence, would have to be recruited when the project commences.

**Implementation of Components A and B.** Components A and B involve the modernization of the bulk as well as the on-farm infrastructure, demonstration of techniques related to agriculture, horticulture, animal husbandry and fisheries, identification of research needs in these disciplines, and promotion of market linkages and agri-business development. The tasks will be carried out in the framework of sub-basins.

The Executive Engineer of the WRO has been made the nodal officer for each sub-basin or a cluster of sub-basins where the command areas are small. A team of specialists deputed at the field level by the participating agencies will work with the designated nodal officer and prepare and update the sub-basin development plans each year. There will be a nodal officer at WRO and MDPU to monitor and facilitate tank-related investments (sub-components A1 and B1).

This plan will cover the engineering and agricultural aspects and will be prepared in a participatory manner, with the involvement of various stakeholders and agencies such as the ATMAs. The first phase of the preparation of sub-basin development plans will start with a meeting of the MDPU team with the project cells formed in each line agency and the line agency personnel in the sub-basin and the farmers of the sub-basin. The farmers will be represented by their WUAs if these have been formed in the sub-basin by the time the development plan is prepared. Otherwise, farmers' representatives chosen by the farmers will participate. Depending on marketability of the produce, the agro-climatic conditions, soils and water resources of the

sub-basin, agricultural development plans (agriculture, horticulture, animal husbandry, fisheries) will be developed by specialists in various disciplines in consultation with the stakeholders, irrigation engineers and the agricultural engineering personnel.

During preparation of the project, this process has been successfully adopted and sub-basin development plans for nine sub-basins have been prepared. The sub-basin development plans are prepared in consultation with farmers, traders, civil society stakeholders through joint walk-through of the irrigation infrastructure and consultation sessions in several villages located in the sub-basin irrigation commands. Needs of modernization of irrigation infrastructure are identified based on crop diversification and veterinary and fisheries requirements. Focus crops specific to the sub-basin are identified and the agricultural, horticultural, on-farm irrigation technologies, and other interventions are designed based on inputs from agricultural marketing specialists, farmers and traders. Each sub-basin development plan is sent to the project cells of the line departments located at Chennai for their review and inputs. These plans and designs will be routed through the respective line agencies to the MDPU where the multi-disciplinary and integrated nature of the developments will be scrutinized. If improvements can be made, the MDPU will return these plans with suggestions for improvement. The process is carried out once again at the sub-basin and then a revised plan is presented to the MDPU. The MDPU will at all times act as facilitators and assist the various sub-basin groups in the preparation of the plans and not act as just a reviewing authority.

When a mutually acceptable plan has been developed among the line agencies, farmers, and other stakeholders, each participating agency will prepare a detailed project report (DPR) and costed designs and interventions taking into account the SEMF and send them to the MDPU after obtaining requisite clearances. The MDPU will furnish the sub-basin development plan and the consolidated DPR to the Bank and the PSC for their review and comments. After receiving the comments and approval from the PSC and the Bank, the MDPU will, in consultation with each participating agency, prepare the annual work plan and budget for each participating agency and submit it to the Finance department for inclusion in the annual State Budget. This work plan will be submitted to the Finance Department in time for inclusion in the budget for the following year. Agreements have been reached with the State Finance Department that budget will be allocated to each participating agency by sub-basin. In the case of the WRO, the allocation would be by activity.

Once this process is over, the participating agencies will execute the works, demonstrations, training programs, extension advice as detailed in the sub-basin development plan with the involvement of the Water users' Associations. Implementation of each activity contained in the sub-basin development plan will be the responsibility of each concerned implementing agency. The MDPU will ascertain that an integrated development plan is being implemented through receipt of monthly and quarterly reports. Physical and financial progress will be monitored at the MDPU by a unit which will also oversee the work of the monitoring and evaluation consultancy. Monitoring of the outputs and outcomes of the project activities will be undertaken by an independent consultant under the guidance and supervision of the MDPU in addition to normal line agency monitoring and reporting systems. Monitoring and Evaluation is a critical activity which will be carried out through a reputable large multi-disciplinary firm under Terms of reference agreed between the GoTN and the Bank. Detailed baseline questionnaires are being prepared based on the extensive experience the GoTN and the Bank in this area, so that the consultant will be ready to initiate work on this important activity soon after Loan/Credit effectiveness.

Most of the physical investments are of an engineering nature and all engineering designs will be subject to the technical sanction by the respective Regional Chief Engineer and the Chief Engineer (Plan Formulation). This process will be facilitated by the project cell located in the Engineer-in-Chief's office. The procurement unit of this cell will provide assistance to the sub-basin WRO units in preparing bid documents and other material following Bank guidelines.

In all aspects of plan preparation and implementation, participation of the private sector will be encouraged and suitable public-private partnership models (e.g. for market linkages) adopted for each sub-basin including the active participation of CSOs/NGOs where there is strong presence of such organizations. On completion of activities in the sub-basin an implementation completion report will be prepared.

**Implementation of Component C.** This component will be primarily executed by the WRO with support from other participating agencies in the formation and capacity building of WUAs. Other participating agencies will identify their training requirements related to the project and furnish them to the MDPU which will incorporate them in the annual work plan for each agency.

The training and strengthening of skills in the WRO will be spearheaded by the training cell created in the Engineer-in-Chief's Office. The cell will identify training institutions within the State, in India and abroad for specific topics related to irrigation development and management and they will prepare an Annual Training Plan. They will also be responsible for selection of candidates for training and will initiate the training process after concurrence is obtained from the Engineer-in-Chief and MDPU. Selection of training institutions will be on a competitive basis following Bank guidelines.

Modernizing communications amongst WRO offices and with WUAs and others through computerization, LAN and WAN connectivity will be implemented by the Information Technology cell created in the Engineer-in-Chief's office. This cell will be responsible for procuring the hardware and software already identified during preparation and also the requisite consultant support to use these and to develop and maintain appropriate irrigation information systems database. This cell will also assist the field engineers in acquiring computer-aided design capabilities envisaged under the project.

The Participatory Irrigation Management cell created in the Engineer-in-Chief's office will lead the efforts in the formation and capacity building of the WUAs. The WRO is familiar with this process since they formed about 1500 WUAs following the enactment of the TNFMIS Act. Synergies with other participating agencies will be pursued in the formation and capacity building of WUAs in the project area. The PIM cell will recruit CSOs/agencies as required in different sub-basins for mobilizing the communities. The PIM cell will also be responsible for the provision of computers and network connectivity and other infrastructure to selected clusters of WUAs on a demand-driven basis.

**Component D.** Sustainable water resources planning and management will be carried out by the State Water Resources Management Agency (SWaRMA) and Basin development and Management Boards to be established in the State. As a pilot, the sustainable water resources management of the Cooum Basin will be initiated in PY1 with the assistance of consultant specialists recruited for this purpose by the SWaRMA and the Cooum Basin Development and Management Board being set up currently. Until the modalities of SWaRMA are worked out the Institute of Water Studies (IWS) will carry out these tasks in association with the State surface and groundwater data center which also has the state-of-the-art water quality laboratory and related equipment.

**Component E.** Project coordination and monitoring and evaluation will be implemented by the MDPU in collaboration with all participating agencies and stakeholders.

Detailed organograms for the institutional arrangement required for implementation as described above are available on file and in the Project Operations Manual.

The GoTN has also taken a number of steps to ensure transparency and accountability during implementation. The GoTN already has in place a TN Transparency in Tenders Act, 1998, which provides for transparency in procurement, and provisions for appeal and disclosure of information at all stages of the procurement process. It is also implementing the recent GoI Right to Information (RTI) Act, and also has in place grievance redressal mechanisms. The GoTN has also provided the Bank with a Transparency and Accountability Plan (Annex 11), which the Task Team has examined and determined to be acceptable for the purposes of this project.

## **Annex 7: Financial Management and Disbursement Arrangements**

### **INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project**

*Overall, financial management arrangements as proposed for the project are considered to be adequate to account for and report on the project expenditure as well as satisfying the fiduciary requirements of IDA.*

#### **Financial Management Assessment: (State Issues)<sup>2</sup>**

The project envisages implementation by eight line departments (i) Water Resources Organization (WRO); (ii) Agriculture Dept; (iii) Agriculture Engineering Dept; (iv) Marketing Dept. (v) Horticulture Dept; (vi) Tamil Nadu Agriculture University (TNAU) (vii) Fisheries dept and (viii) Animal Husbandry Dept. With the exception of the TNAU, all the line departments operate under a common state financial management framework i.e budgeting, internal control, accounting and audit arrangements. Only the funds flow and accounting arrangements for the WRO are different from the other departments i.e it follows the Letter of Credit system – LOC, under which it is authorized to issue cheques to contractors based on approved limits, while other departments have to submit bills to the treasury for the payment and accounting. With a view to determine the feasibility to use the state systems, an in-depth assessment of the financial management arrangements was carried out of three line departments, i.e, Water Resources Organization (WRO) which uses the LOC system, and Agriculture Dept. and Agriculture Engineering Dept. (AED), which use the treasury systems. These departments also have a majority role in project implementation covering approx 70 % of the project cost. The assessment report (which provides input to this overall assessment) covered aspects relating to institutional arrangements, funds flow, accounting, internal controls, audits, staffing etc. In addition a separate assessment using the financial management questionnaire, desk review of financial statements, budget documents and discussions with the finance staff of the Tamil Nadu Agriculture University (which is outside the core GoTN Departments) was carried out.

This assessment supplements a preliminary assessment of the public financial accountability arrangements in the state of Tamil Nadu carried out by the Bank in 2003/2004, which concluded that the framework for public financial accountability in Tamil Nadu is generally sound. Its strengths include: (i) the oversight role of legislature over public finances; (ii) regular compilation and timely preparation of monthly accounts (within 30 days of the following month) and annual accounts (usually within six months after close of accounts); and (iii) the constitutionally guaranteed independence and broad mandate of the Comptroller & Auditor General (C&AG). However adherence to internal control eg lack of timely reconciliation with AG (A&E), parking of funds in personal deposit accounts etc need to be tightened.

Based on the assessment it is found feasible to use the state systems for financial management (except for the TNAU which is an independent entity) with some modifications to include:

- *Preparation of Financial statements and audit opinion on the same.* Project specific financial statements are not required to be prepared under the normal requirements in the States. In this project discussions have been had with the Finance department in order to align budget for the project activities by components and sub basins which will help accounting for and

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<sup>2</sup> Country issues impact the State/ project to a limited extent i.e lack of financial statements and audit opinion on the same- due to similar audit structure across the country. Other Issues are related to the State, which has its own legislature which approves the budget, has its own Public Accounts Committee and its own financial and treasury rules



- The level of administrative & financial delegation for district level officers in some of the line departments is low and needs to be enhanced to facilitate effective implementation. – The Finance Dept in consultation with the MDPU will review the existing delegations for various line departments especially at District level and where necessary provide enhanced delegations for implementing the project

### **Implementing Arrangements**

This is a multi-departmental project with eight line departments (Water Resources Organization (WRO), Agriculture Engineering Dept (AED), Agriculture Dept., Agriculture Marketing Dept., Tamil Nadu Agriculture University (TNAU), Horticulture Dept., Animal Husbandry Dept, Fisheries Dept , involved in the implementation of activities within their respective administrative responsibilities. A Multi Disciplinary Project Management Unit (MDPU) headed by a senior Administrative Service Officer as Project Director has been created and has technical staff/ consultants from all the line departments involved in the project including a finance unit. The Project Director will report to the Secretary –Water Resources Organization. The MDPU will have the responsibility for overall planning, coordination, monitoring and reporting of the implementation progress of the project. The project will work with Water users Association (WUAs), to be formed during project implementation. The WUA will have a role in the project in terms of planning and supervision of construction at appropriate levels and no funds are expected to flow to WUAs except subsidies for agri-finance and agri-business and in kind support for farm equipments, infrastructure support (buildings and computers) and trainings.

### **Budgeting**

Project activities will be budgeted under the respective demand for grants of project line departments; however the Annual Work Plan (AWP) and budget proposals will be reviewed, approved by the MDPU before forwarding to the Finance Dept. to ensure consistency and coordination of plans/budgets for the various departments. The budget will be incorporated in the State Budget by sub-basin using the minor head/ sub head in the GoTN budget code. The new account codes have been discussed with the Finance Dept. The MDPU will submit the detailed budget estimates for the FY 2007-08 to Finance Department in line with the budget cycle i.e by December 31 2006. In order to avail of grant funding from the GoI for tank restoration sub-component, a separate sub-head will be opened to budget & account for expenditure on tank restoration. As regards TNAU the budget provision will be made for TNAU as grant in aid in the demand for grants for the Agriculture Dept. Similarly on the receipt side the GoTN will reflect the funds to be received from the Bank and GOI.

### **Funds Flow – Govt. of Tamil Nadu to Project**

Finance Department will issue LOC to WRO and allocate budget to the other line departments based on the approved budget. Since externally aided projects are exempted from quarterly expenditure control, no significant delays are expected in funds flow. Our assessment indicates that there have been delays in the issue of LOC, both due to processing delays internal to the WRO and delays in actual issue by the Finance Dept. In order to ensure that funds are available with the WRO in a timely manner to meet project expenditures it has been agreed with the finance department that the LOC will be issued for six month's (against the norm of one quarter) fund requirement by the Finance Dept within two weeks of the request by WRO. The WRO and line departments will in turn re-allocate the LOC and the allotted budgets to the Divisions and District/ Block units for incurring actual expenditure. Funds to the TNAU will be provided as a advance on a quarterly (the government accounting system will record this as expenditure) based on approved activity plan and progress reporting.

## **Accounting & Internal Control**

Books of accounts by the WRO, Line Departments will be maintained under the standard Government Accounting Systems and monthly accounts will be rendered to the AG (by the WRO directly and by other Line Departments through the treasury) and reconciled with the AG on a monthly basis. Our assessment indicates that while the divisions of WRO are timely in rendering of accounts to the AG and also reconciling their accounts, there is a lag of about 2 months in the reconciliation of accounts with the AG at a departmental level. The annual financial statements will be prepared only after the reconciliation with the AG (A & E). Funds released to TNAU will be considered as advance for project purposes (even though the Government accounting will record this as an expenditure) and will be considered as expenditure only on receipt of quarterly expenditure and progress reports. TNAU will open a separate Bank account for the project funds to keep it distinct from the funds received from GoTN funds for establishment costs. TNAU will consolidate the expenditures from its various field units and send a consolidated report to the MDPU (via Dept of Agriculture) on a quarterly basis. Parking of funds in Personal Deposit, Public Ledger Accounts will not be permitted.

## **Finance Staffing**

The staffing structure for the Finance & Administration Unit will include an officer from the Treasury & Accounts Service, supported by a Superintendent from the WRO and two/ three accountants either on deputation or on contract basis. Currently the MDPU has one officer from the Treasury & Accounts service deputed on part time basis. The staffing is expected to be fully in place by January 31, 2007. This is considered appropriate as the activities will start only from the financial year 2007-08. The existence of a fully functional MDPU including the finance unit is a legal covenant. In each of the line departments the Financial Advisor/ Chief Accounts Officer will be responsible for financial reporting to the MDPU.

## **Internal Audit**

The project will have an internal audit by the Internal Audit & Statutory Board (IA&SB - a unit under the Department of Finance) with a Chartered Accountants firm providing capacity building support to IA&SB. The scope of internal audit will be to ensure that the internal control procedures (reconciliations, timely settlement of advances drawn, balances, if any, in personal deposit accounts, , physical verification of assets provided to WUA etc) are being adhered to at the project level i.e line departments at various levels including State, District, Divisions and Block level and identify any bottlenecks or constraints in the implementation. The terms of reference will be reviewed by the Bank. The internal audit is expected to be in place within six months of effectiveness of the project.

## **Impact of procurement arrangements**

Based on the procurement plan for the first 18 months approx US\$45 million will be subject to prior review by the Bank. This represents 25% of the first 18 months cost. While the Bank may carry out post review of contract below the threshold, given the large number of entities/ depts involved the scope of review of internal auditors will also include the review of post review contracts especially national shopping and direct contracting.

## **Financial Reporting**

The financial reporting (interim financial reports) under the project will be by the project components broken down by sub-basins. These are closely linked to the budget codes agreed with the finance department and will be based on the expenditures recorded in the AG (A&E) books of

account. In addition the WRO will provide a statement on security deposit with -held and paid to the contractors and the AED will provide a report on contributions by the WUA/ farmers, if any, for activities such as drip irrigation, farm equipments etc. The finance unit in the MDPU will have the responsibility of obtaining expenditure reports from the various line departments and preparing and submitting the consolidated interim and annual financial reports to the Bank. The interim financial reports will be used as the basis for disbursement.

### **External Audit**

The Comptroller and Auditor General of India (CAG) through its offices in Tamil Nadu will be the external auditor for the project. The CAG's office will conduct an annual audit of the project financial statements (sources and uses of funds) and will also cover the expenditures incurred by the TNAU. The audit report will be submitted to the Bank within six months of the close of each financial year. The Terms of Reference for the audit (along with the draft format of the financial statements and audit opinion) have been reviewed by the Bank and will be sent by the project to the CAG (through DEA).

The following audit reports will be monitored in the Audit Reports Compliance System (ARCS):

<b>Implementing Agency</b>	<b>Audit</b>	<b>Auditors</b>
Government of TN	Project Audit	Comptroller and Auditor General of India, Tamil Nadu
Department of Economic Affairs/GOI	Special Account	Comptroller and Auditor General of India, New Delhi

### **Disbursement Arrangements**

Funds from the World Bank will be made available to GoTN (through the GOI) under the standard terms of on-lending between GoI and the States. The Bank will provide an initial advance, which will be transferred by GoI to the GOTN. The advance will be enhanced subsequently proportionate to the increased level of expenditure. Subsequent releases will be on re-imburement basis, based on Bank's share of eligible project expenditure. This will be determined on the basis of the interim financial reports (Component wise) from the AG's accounting system with the exception of TNAU wherein the funds transferred will be considered as an advance and only the actual expenditure reported by the TNAU will be considered as expenditure. This will enforce discipline and ensure that the divisions are regular and timely in submission / reconciliation of monthly/ quarterly accounts to the AG. With respect to expenditure on the restoration of tanks, which is to be partly financed by the GoI (to the extent of 25%), on reimbursement basis. IDA funds equivalent to USD 75 million will be transferred as grant by GoI to GOTN.

### **Supervision Plan**

From a financial management perspective, the project will need intensive review specially in areas related to: (i) procedural delays in issue of LOC; (ii) budget release orders etc.; and (iii) the financial reporting by various line departments. This will be through a combination of periodic desk reviews and field visits.

## **Annex 8: Procurement Arrangements**

### **INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project**

#### **1. General:**

- [a] Procurement for the proposed project will be carried out in accordance with the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004, and the provisions stipulated in the Legal Agreement.
- [b] The general description of various items under different expenditure categories is given below. The different procurement methods and consultant selection methods, prior review requirements, and time frame are agreed between the Borrower and the Bank project team. A detailed Procurement Plan for the first eighteen months of the project has been prepared. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.
- [c] All goods, works and services financed under the project shall be procured using the Bank's Standard Bidding Documents [SBDs] and Standard Request for Proposals [RFPs] as agreed with GoI Task Force [and as amended from time to time]

#### **1.1 Procurement of Works:**

- [a] The Project will finance the restoration, revival and modernization of selected existing irrigation infrastructure in the State. Works procured under this project will mainly include rehabilitation and modernization works in sixteen basins of the State of Tamil Nadu namely Chennai, Palar, Varahanadhi, Ponnaiyar, Paravanar, Vellar, Agniyar, Parambikulam Aliyar, Pambar Kottakarayar, Vaigai, Gundar, Vaippar, Kallar, Tamiraparani, Nambiyar, and Kodayar. Rehabilitation and modernization works of *anicuts*, main canals, supply channels, tanks, check dams, repairs of head works and head regulators, replacement/provision of cross regulators, and improvement of service roads and inspection path on the banks of the canal, cattle *ghats*, where necessary, additional lining, bridges, masonry works, and escapes would be carried out.
- [b] The project will also support civil works for construction of office building of MDPU together with requisite office facilities for the bifurcated WRO, office building of Basin Boards, WUA buildings, Kiosks, modification of SWaRMA building, on-farm development works, livestock productivity improvement demonstration -civil works, Fisheries productivity improvement demonstration civil works, agricultural marketing and agro-processing related civil works, etc.
- [c] The rehabilitation and modernization work on nine Sub-Basins shall be initiated during first 18 months of the project by Water Resource Organization [WRO], which was an arm of PWD and has recently been bifurcated from PWD. This will mean procurement activities will begin for about 1,900 tanks in the first year and 2,500 tanks in the first 18 months. During the first 18 months, there will be about 4 packages less than Rs. 10 million, 28 packages estimated to cost between Rupees 10

and 50 million each, 30 packages costing between Rupees 50-100 million and 10 packages costing above Rupees 100 million. All these packages will be procured following NCB procedures. The maximum estimated value of the contract in these packages is Rs. 141 million. In view of the geographical spread of the works and the site conditions, foreign bidders are not likely to be interested and, therefore, there will be no works procured following ICB procedures. However, if foreign bidders want to participate in the bidding under NCB procedures, they will not be precluded.

## **1.2 Procurement of Goods & Equipment:**

- [a] Goods & Equipment procured under this Project will include office and IT/MIS equipment (desktop and laptop computers, printers, servers, software, GIS packages, scanners, UPS, photocopiers, fax machines, LAN, WAN etc.), other training and communications equipment (multimedia projectors, A/V equipment, video conferencing equipment etc.), field equipment (modern survey equipment, soil survey equipment, GPS, digital cameras, etc.), office furniture, pump sets, drip & sprinkler irrigation equipment, flow measuring devices, telemetry equipment, satellite imagery, maps, datasets, equipment for modernization of irrigation systems, and laboratory equipment, vehicles, spare parts for existing equipment, as also material and equipment required for irrigation modernization, agriculture intensification (e.g. seeds, plants, saplings), animal husbandry, horticulture, fisheries, and processing/marketing activities.
- [b] During the first 18 months of the project, there will be about 4 contracts to be procured under ICB procedures. The maximum estimated value of the ICB contracts in the first 18 months will be Rs. 54 million. In addition to above, furniture, office equipment, pipes, farm equipment etc. are also planned to be procured during the first 18 months of the project. These items will be procured through decentralized process. Depending upon the cost of individual contract, NCB/Direct Contracting/ Shopping procedures will be followed.

## **1.3 Selection of Consultants:**

- [a] The key consultancies to be procured under this project include:
  - (1) Monitoring and Evaluation
  - (2) Topographic and cadastral survey of all irrigation systems covered under the project
  - (3) Information Management Systems
  - (4) Design support for Modernization of Irrigation System
  - (5) Construction Quality Management and Technical Supervision
  - (6) Basin Planning (incl. knowledge base, Decision Support Systems development) for selected Basins
  - (7) Internal Audit Capacity Building
- [b] A number of other small consultancies will also be procured under the project that will be required to assist in the implementation of the project and to build capacity in the implementing institutions.
- [c] Shortlists of consultants for services estimated to cost equal or less than US\$500,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of Paragraph 2.7 of the Consultant Guidelines.

- [d] In addition to training through consultants, NGOs/CSOs, workshops etc. under the project, the services of Government Institutes and Universities such as Tamil Nadu Agricultural University, Irrigation Management Training Institute, Trichy will be utilized. For these Government agencies, only the cost of per-diem to be paid to the participants, their travel, boarding, training materials to be made available to them or any faculty hired specifically for the training and paid will be funded by the Bank. The administrative and overhead costs if any charged by these Government agencies will not be funded. However, in case the training institute /organization is selected competitively, the contract price payable to the organization will be funded .

#### **1.4 Operational Costs:**

The project will also finance operating costs such as asset maintenance, office expenses (e.g. related to MDPU and project activities), IT/networking charges, vehicle rental, office supplies, salaries and allowances of incremental staff in the participating agencies and all staff in the MDPU.

## **2. Assessment of the Agency's capacity to implement Procurement:**

The procurement under the Project will be carried out by nine Implementing Agencies of GoTN as briefly described below:

### **2 [a] Water Resources Organization , WRO [approx. USD345 million]**

In WRO, where large parts of the procurement (about 60% of the project cost) will take place, the procurement cell headed by a Joint Chief engineer, reporting directly to Engineer-in-Chief has been established. Joint Chief Engineer will be supported by adequate staff. All these staff will be progressively in position by the end of December 2006. These staff/engineers will receive procurement training through ASCI, Hyderabad or NIFM, Faridabad. This cell will work like a technical secretariat to Engineer-in Chief who is the Chairman of the tender award Committee. The bid documents and evaluation reports of the packages requiring the approval of Tender Award Committee , to be prepared by the respective engineers in the district/field, will first be reviewed by this cell and then forwarded to the Tender Award Committee for approval. After approval, the bid documents and evaluation reports, requiring the Bank's prior review will be forwarded to MDPU for forwarding to the Bank and obtaining the Bank's clearance/no objection. The procurement to be made by WRO will be handled by Executive Engineers and Superintending Engineers in the 63 sub-basins, operating under four regional Chief Engineers. Further, Chief Engineers will also be involved in Procurement related activities like review of award recommendation.

The following will be procured by WRO:

**Works:** related to rehabilitation of irrigation and drainage systems in selected sub -basins, building refurbishment, Irrigation Information Center, back up/operational control room/digital library/IT enabled training room, and WUA buildings construction/refurbishment.

**Goods and Equipment:** pertaining to WRO and SWaRMA strengthening like Computers[desk top and lap tops], software, office equipment [copier, vide o-conferencing peripherals, furniture, other hardware, networking], Irrigation Information Center/operational control room equipment [including projectors, computers, plotters printers, etc.], IT enabled Training equipment, Modern survey equipment[ GPS, To tal

stations etc., Vehicles, office equipment for WUAs and equipment for rehabilitation of sub-basin schemes, telemetry, canal automation, SCADA, etc .

**Consultancy Services:** pertaining to Basin management/creation of knowledge base/ Decision Support Systems Development, Topographic and cadastral survey of all irrigation systems covered under the project, Design of selected systems, Construction Quality Management and Technical Supervision.

**2 [b] Agriculture Engineering Department, AED** [approx. US\$75 million]

The procurement to be done by AED will be handled by identified Procurement Officers for the project. The following will be procured by AED:

**Works:** pertaining to recharge structures, farm ponds, other on-farm development works and micro-irrigation schemes.

**Goods:** pertaining to IT/office equipment/networking, drip and sprinkler systems, on-farm development equipment.

**Consultancy:** Short-term inputs by individual specialists in areas such as modern micro-irrigation techniques.

**2 [c] Agriculture Department** [approx. US\$22 million]

The procurement to be done by Agriculture Department will be handled by identified Procurement Officers for the project. Agriculture Department will procure goods pertaining to agriculture inputs for demonstrations/training, farm equipments, testing equipments, IT goods, and office equipment.

**2 [d] Horticulture Department** [approx. US\$16 million]

The procurement to be done by Horticulture Department will be handled by identified Procurement Officers for the project. Horticulture Department will procure goods and equipment like seeds, plants, equipments for modern horticulture, de-weeding, integrated pest management and integrated nutrient management for demonstrations/training

**2 [e] Agriculture Marketing Department, AMD** [US\$6 million]

The procurement to be done by AMD will be handled by identified Procurement Officers for the project. AMD will procure works pertaining to Marketing Infrastructures, kiosks; goods pertaining to IT and office equipment, and Consultancy services pertaining to market intelligence/market information systems, setting up small and medium scale agri-business enterprises and training.

**2 [f] Animal Husbandry Department** [approx. US\$9 million]

The procurement to be done by Animal Husbandry department will be handled by identified Procurement Officers for the project. Animal Husbandry department will procure works pertaining to Live stock productivity improvement demonstration and goods pertaining to IT and office equipment. The department will also utilize the services of Tamil Nadu Medical Services Corporation [TNMSC] for procurement of medicines for veterinary health.

**2 [g] Fisheries Department** [approx. US\$4 million]

The procurement to be done by Fisheries department will be handled by identified Procurement Officers for the project. Fisheries Department will procure works pertaining to Fisheries productivity Improvement demonstration, construction of fish seed bank, goods pertaining to fisheries productivity Improvement demonstration, IT, office equipment and consultancy services required to improve fish breeds of short duration given that the water storage facilities in Tamil Nadu generally have only a 90-day water availability.

**2 [h] Tamil Nadu Agricultural University, TNAU [approx. US\$20 million]**

The procurement to be done by TNAU will be handled by identified Procurement Officers for the project. TNAU will procure goods and equipment pertaining to improved agriculture tools for demonstration, soil testing kits, IT and office equipment.

**2 [i] Multi Disciplinary Project Unit, MDPU**

MDPU will procure goods and equipment pertaining to office equipment [copier, projectors, video-conferencing, peripherals, furniture, other hardware, networking, and other communications equipment], computers [desktops and laptops], vehicles and Consultancy services pertaining to monitoring and evaluation of all project parameters and Internal Audit Capacity Building consultancy. MDPU will also provide the management support and co-ordination for all the procurement to be carried out by different Implementing Agencies. The procurement to be done by MDPU will be handled by a team of three officials; one executive engineer, one assistant executive engineer and one junior engineer who have all been trained in ASCI for the Bank funded procurement. These officials in the MDPU will review the bidding documents and the evaluation reports for prior review cases received from all the Implementing Agencies and co-ordinate for forwarding the proposals to the World Bank through the Project Director. In addition, presently, MDPU has also hired the services of a consultant who co-ordinates and helps the team in procurement activities and advises on preparation of bid documents and procurement plan. MDPU will also be responsible for the Agri-business development facility operation.

- 2.1 Works for about 60% of the project cost under the project will be procured by WRO which will be for rehabilitation and modernization of tanks and canals and is the major component of the project. The works for recharge structures, farm ponds and other non farm development works which will be about 5 % of the project cost will be procured by Agriculture Engineering Department. Works and goods to be procured by other departments will be small value procurement, and will be procured following mostly shopping procedure.

The procurement of the key Consultancies under the Project will be carried out by the MDPU, WRO and SWaRMA, a body still to be constituted from existing WRO units. The three officials at MDPU who will coordinate procurement activities of all the departments and will work as single window point of contact for the World Bank, will also be responsible for procurement of Consultancies.

The standard questionnaire duly filled in, for assessing capacity of all the implementing agencies have been obtained. Though rules being followed by all the agencies are essentially the same and all of them are required to comply with the Transparency in Tender Act, 1998, some of the departments like Animal Husbandry, Tamil Nadu Agriculture University, Horticulture Department, Agriculture Department, Agriculture Marketing Department and Fisheries Department have little exposure to Bank procurement procedures.

**2.2 Existing Delegation:**

The Government of Tamil Nadu has issued an Act “The Tamil Nadu Transparency in Tenders Act, 1998” to provide for transparency in the public procurement and to regulate the procedure in inviting and accepting tenders. It extends to the whole of the State of Tamil Nadu.

For WRO, as per the powers delegated to various officials through a Government Order [GO] for deciding tender , all contracts beyond Rupees 10 million are required to be considered and approved by a Tender Award Committee..

Therefore procurement decision for most of the procurement by WRO will be referred to the Tender Award Committee. As per GO Ms. No. 555 P.W. (G2 dated November 17, 1999, the composition of the Tender Award Committee is as under:

Engineer-in Chief, WRO	Chairman
Chief Engineer (Buildings)	Member
Chief Engineer, WRO (Chennai region)	Member
Representative from the Finance Department	Member

This Committee is still in vogue and will consider and accord approval to all award recommendation from WRO beyond Rs. 10 million .

For other implementing agencies, the project specific powers will be delegated before March 31, 2007 to facilitate effective implementation of project.

### **2.3 Action Plan for Capacity Building:**

As nine Implementing Agencies will be involved with procurement and the procurement will be handled at district and block levels, the overall project risk for procurement is considered Substantial.

WRO, which will be responsible for majority of procurement has earlier executed TNWRCP project funded by the Bank as a part of PWD. However , there is still a need to train the staff of WRO and other agencies on World Bank procurement procedures.

The following capacity building steps have been/will be taken:

- (a) MDPU has a procurement wing consisting of one Executive Engineer, one Assistant Executive Engineer and one Assistant Engineer/ Junior Engineer. All these three officials have already received procurement training at ASCI Hyderabad. This cell will be further strengthened if required during implementation.
- (b) Nodal Procurement Officers of the line departments have been placed directly under the head of Department as the Procurement in charge. In WRO, where large parts of procurement will take place, the procurement cell headed by a Joint Chief Engineer, reporting directly to Engineer-in Chief has been established.
- (c) The MDPU has given one day orientation to the procurement officers of all line departments and the nodal officer of each sub-basin.
- (d) Training will be given to all Nodal procurement officers of all line departments and the WRO procurement cell at ASCI or similar institute [NIFM] or by organizing training at Chennai by the said agency/person. This will be arranged in the first year subject to availability of ASCI.
- (e) Procurement workshops will be held at Chennai for all the SEs and Executive engineers of sub basins and nodal officers of the line departments and their replacement on transfer, if any; and
- (f) Annual refresher course will be held for any new entrant(s) to the project

The Bank will also organize procurement workshops, one in each of the four regions where officials of all the departments involved in procurement may participate. First of such workshops will be held before March 31, 2007.

In view of 9 agencies being involved with the procurement, there will be a need of greater efforts by the MDPU to ensure consistency of the proposals being forwarded to the Bank and also those under the post review. The Bank's efforts will also be substantial in the beginning stages of implementation.

### 3. Procurement Methods:

- [a] Goods estimated to cost US\$300,000 or more per contract and works estimated to cost US\$10,000,000 or more per contract will be procured following ICB procedures as per Section II of the Procurement Guidelines. Goods estimated to cost US\$30,000 or more but less than US\$300,000 per contract and works estimated to cost US\$30,000 or more but less than US\$10,000,000 per contract will be procured following NCB procedures in accordance with the requirement of Paragraph 3.3 of the Guidelines and the following:
- i) Only the model bidding documents for NCB agreed with the GOITask Force [and as amended from time to time], shall be used for bidding;
  - ii) Invitations to bid shall be advertised in at least one widely circulated national daily newspaper, at least 30 days prior to the deadline for the submission of bids;
  - iii) No special preference will be accorded to any bidder either for price or for other terms and conditions when competing with foreign bidders, state-owned enterprises, small-scale enterprises or enterprises from any given State;
  - iv) Except with the prior concurrence of the Bank, there shall be no negotiation of price with the bidders, even with the lowest evaluated bidder;
  - v) Extension of bid validity shall not be allowed without the prior concurrence of the Bank (i) for the first request for extension if it is longer than four weeks; and (ii) for all subsequent requests for extension irrespective of the period (such concurrence will be considered by Bank only in cases of *force majeure* and circumstances beyond the control of the Purchaser/Employer);
  - vi) Re-bidding shall not be carried out without the prior concurrence of the Bank. The system of rejecting bids outside a pre-determined margin or "bracket" of prices shall not be used in the project;
  - vii) Rate contracts entered into by Directorate General of Supplies and Disposals, will not be acceptable as a substitute for NCB procedures. Such contracts will be acceptable however for any procurement under National Shopping procedures;
  - viii) Two or three envelope system will not be used.
- [b] Goods and works estimated to cost less than US\$30,000 per contract may be procured following Shopping procedures in accordance with the requirement of Paragraph 3.5 of the Bank's Guidelines.
- [c] Goods and works estimated to cost less than US\$1,000 and upto an aggregate value of US\$ 2 million, and the goods and works which meet the requirement of Paragraph 3.6 of the Bank Guidelines may be procured following Direct Contracting Procedures. Works that meet the requirement of paragraph 3.8 of the Guidelines may be implemented, with prior clearance from the Bank following Force Account method.

- [d] Consultancy Services will be procured following Least Cost Selection, CQ, Single Source, QBS and QCBS methods in accordance with the Bank's Guidelines. Contracts estimated to cost US\$200,000 and below may be procured following CQ method of selection in accordance with the Consultant Guidelines. The services of individual consultants will also be procured in accordance with the Bank's Guidelines.

### **3.1 Review by the Bank**

- [a] First contract of goods, and works to be procured by each Implementing Agency following NCB procedures, irrespective of the value, all contracts for goods and works procured following ICB, all contracts for works procured by WRO and estimated to cost US\$1.5million and above, all contracts for works procured by other Implementing Agencies and estimated to cost US\$500,000 and above, all contracts estimated to cost US\$10,000 and above awarded on Direct Contracting basis, will be subject to prior review by the Bank.
- [b] Consultancy contracts to be awarded to firms and estimated to cost US\$100,000 or more, and contracts award to individuals and estimated to cost US\$50,000 or more, will be subject to prior review. Further sole source contracts to firms estimated to cost US\$50,000 or more will be subject to prior review.
- [c] All other procurement will be subject to post review.

### **3.2 Audit and Post Review:**

- [a] Internal auditors of the GoTN will be trained on the procurement under the World Bank funded project and then deployed to carry out the post review of contracts.
- [b] In addition, the Bank has the right to carry out the post review of any contracts awarded by any Implementing Agency on sample basis and the sample will be decided by the Bank. This post review will be started early on in the project cycle.

## **4. Procurement Plan:**

4.1 GoTN has developed a Procurement Plan for 18 months for the Project implementation which provides the basis for the procurement methods. This plan has been agreed between the Borrower and the Project Team in December, 2006, and is available at New Delhi Office. It will also be available at the Bank's external website. The procurement plan will be updated in agreement with the Project Team annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

### **4.2 Frequency of Procurement Supervision:**

In addition to the prior review supervision to be carried out from Bank offices, the capacity assessment of the implementing agency has recommended two supervision missions [one every six months] as part of overall Bank supervision missions to visit the field to carry out post review of procurement actions.

## Attachment 1

### Details of the Procurement Arrangement involving international competition

#### 1. Goods and Works and non consulting services.

(a) List of contract Packages which will be procured following ICB and Direct contracting in the first 18 months

1	2	3	4	5	6	7	8	9
Ref. No.	Contract (Description)	Estimated Cost (Rs. Million)	Procurement Method	P-Q	Domestic Preference (yes/no)	Review by Bank (Prior / Post)	Expected Bid-Opening Date	Comments
01/IAMWARM /ICB/WRO/Computers/06-07	Procurement of Desktop Computers – 200 Nos. and Peripherals and Laptop Computers – 100 Nos.	54.0	ICB	NA	Yes	Prior	February 07	
02/IAMWARM /DC/WRO/Software/07-08	Procurement of Software	4.5	DC	NA	No	Prior	May 07	
08/IAMWARM /DC/WRO/Vehicle/07-08	Procurement of Vehicles	2.7	DC	NA	No	Prior	May 07	
21/IAMWARM /ICBWRO/WANs/06-07	Providing Wide Area network for WRO	80.0	ICB	NA	Yes	Prior	April 07	
11/IAMWARM /ICB/WRO/Computers/ 07-08	Procurement of desktop Computers – 200 Nos. and Peripherals and Laptop Computers – 100 Nos.	54.0	ICB	NA	Yes	Prior	January 08	
12/IAMWARM /DC/WRO/Softwares/07-08	Procurement of Software	11.3	DC	NA	No	Prior	January 08	
18/IAMWARM /DC/WRO/Vehicle/07-08	Procurement of Vehicles	4.5	DC	NA	No	Prior	March 08	
19/IAMWARM /ICB/WRO/WUA/07-08	Procurement of office equipment for WUAs	27.0	ICB	NA	Yes	Prior	April 08	

(b) All contracts awarded under ICB Contracts and all contracts estimated to cost USD 10,000 and above, awarded on Direct Contracting will be subject to prior review by the Bank.

2. **Consulting Services.**

(a) List of Consulting Assignments with short-list of international firms:

1	2	3	4	5	6	7
Ref. No.	Description of Assignment	Estimated Cost (Rs. m)	Selection Method	Review by Bank (Prior / Post)	Expected Proposals Submission Date	Comments
1.	Monitoring and Evaluation	135.0	QCBS	Prior	April , 2007	
2.	Topographic and Cadastral Surveys	125.0	QCBS	Prior	April, 2007	
3.	Information Management Systems	200.0	QCBS	Prior	May, 2007	
4.	Design support for Modernization of Irrigation Systems	60.0	QCBS	Prior	June, 2007	
5.	Construction Quality Management and Technical Supervision	150.0	QCBS	Prior	June, 2007	
6.	Basin Planning [ including knowledge base, Design Support System Development	135.0	QCBS	Prior	May, 2007	

(b) Consultancy services estimated to cost US\$100,000 and above per contract and Single Source selection of consultants (firms) for assignments estimated to cost US\$50,000 and above will be subject to prior review by the Bank.

(c) **Short lists composed entirely of national consultants** : Short lists of consultants for services estimated to cost less than US\$500,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

## **Annex 9: Economic and Financial Analysis**

### **INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project**

1. The TN-IAMWARM project focuses on improving the productivity of irrigated agriculture in about 617,000 ha of registered ayacut in 63 sub-basins, out of which only 55% area gets fully irrigated now. Out of this, 5,763 tanks account for 403,410 ha and canals/distributaries account for 213,250 ha of registered ayacut. About 90% of the 677,650 farmers in the project area are small farmers with an average farm holding size of 0.55 ha to support an average family size of five. Current levels of irrigation coverage and productivity can support only a fifth of the families to be above poverty line. Project interventions are designed to modernize the irrigation service delivery and improve irrigated agriculture productivity with effective sustainable water resources management in a river sub-basin framework. Improved service delivery is expected to close the gap and stabilize the partially irrigated area, together accounting for about 45% of the registered ayacut.

2. The project investment was appraised for the major investment activities in the selected 63 sub-basins, which are broadly grouped into homogeneous clusters, first based on hydrology and then based on agro-climate. Nine sample sub-basins were selected to represent these diverse clusters and detailed hydrologic database covering registered ayacut, water balance, area irrigated was compiled for these sample sub-basins. Four major agroclimatic regions namely; north western zone, north eastern zone, southern zone and western zone cover 95% of the selected project sub-basins. These sample sub-basins are carefully drawn to represent diverse agroclimatic regions in order to capture the non-homogeneous production and resource environment prevailing in the project area. Detailed investment costs for the irrigation system modernization and agriculture intensification and diversification estimated for the nine sample sub-basins was used first to project the costs for six hydrologic clusters and then aggregated for all the project sub-basins. Benefits are estimated first for nine sample sub-basins and projected for four agroclimatic zones using registered ayacut as weights and aggregated as overall project benefits from 63 project sub-basins. Economic and financial analysis was conducted for assessing the viability of the overall project based on a detailed sub-basin wise analysis of nine sample sub-basin proposals.

3. The analysis is based on sample data for 2003/05 on farm size, land use, cropping intensity, irrigation source and cost of cultivation for 11 major crops, collected from 614 farmers drawn from 60 taluks in 22 districts representing diverse major agro-climatic zones of Tamil Nadu. Representative small farm models (less than 2 ha) were developed by agroclimatic zones and aggregated for the project area as a whole. Crop budgets were prepared for paddy, bajra, blackgram, cotton, ground nut, jowar, maize, sesamum, sugarcane, fruits (sapota, mango, amla and banana), plantation crops (coconut, arecanut), spices (onion, chillies) and vegetables (bhendi, tomato and brinjal) for diverse agroclimatic zones and aggregated for the project area as a whole using crop area as weights. Activity budgets for livestock and fisheries were formulated based on the census data and ongoing schemes in the respective departments. For this, project sub-basins are categorized into three groups based on the productivity potential of livestock and fisheries before aggregating the benefits from livestock and fisheries development due to the project as a whole. The with/without project assumptions are guided by data collected and studies conducted under TNWRCP. Project costs and benefits are estimated at 2006 prices over a period of 25 years with 12% as the opportunity cost of capital.

## Project Benefits

4. Irrigated Agriculture Irrigation system modernization for improved service delivery and modernized irrigated agriculture, together accounting for 86% of project costs is targeted to cover about 617,000 ha of land area, out of which, under WOP scenario, 55% gets adequately irrigated and 25% gets partially irrigated while 20% remains as gap ayacut. Since agriculture impacts are strongly influenced by irrigation service improvements, these two activities are clubbed together while considering their costs and benefits. Major sources of irrigated agriculture benefits (T -1) are from (i) *area expansion* (shifts in cropped area from gap ayacut and partially irrigated to fully irrigated coverage due to the project interventions); (ii) *diversification* (increased share of area under oilseeds, maize, fruits, vegetables and green fodder following the modernization of irrigated agriculture in project sub-basins); and (iii) *technology impacts* (increased yield and/or reduced production costs following the resource efficient technology interventions like SRI in paddy and micro-irrigation in major crops like coconut, sugarcane, maize and groundnut).

**T-1 Summary of Project related incremental impacts**

Project Impacts	Unit	All Project Sub-Basins
<b>Increased irrigated area</b>		215830
Fully irrigated (Canals)		42650
Fully irrigated (Tanks)	ha	80680
Partially irrigated (Canals)		31990
Partially irrigated (Tanks)		60510
<b>Agriculture Intensification</b>		
<i>Increased cropping intensity</i>	%	17%
<i>Increased crop area</i>		
Paddy (SRI)	ha	66500
Coconut/Sugarcane/Fruits (Drip with fertigation)		52500
Vegetables/groundnut (Micro irrigation)		51250
<b>Agriculture Diversification</b>		
<i>Increased crop area</i>		
Maize		28400
Oilseeds	ha	29000
Fruits and Vegetables		12000
Sugarcane		10800
<i>Improved cross bred lactating cows</i>	Number/year	165680
<i>Improved aquaculture under WSA</i>	ha	78000
<b>Increased Crop Productivity</b>		
Paddy/Cotton/Sugarcane	%	30%
Maize	%	100%
Coconut/Vegetables/Fruits/Pulses	%	40%
Groundnut	%	50%
<b>Increased Production</b>		
Food grains		340000
Oilseeds		407720
Sugarcane		2083300
Fruits/Vegetables	tonnes/yr	365000
Fodder		1032600
Milk		587000
Fish		22500
<b>Increased Income</b>		
Directly benefiting farm households	Number	677650
Increased Rural Farm employment	Jobs/year	49750
Incremental farm income	Rs/year	12700
Farm households to go above poverty line	Number	55550
Value of Incremental production at project completion	Billion Rs/year	7.1

5. Following the physical improvements in the sub-basins, 90% of the registered ayacut will get adequately irrigated and 10% partially irrigated. Incremental land area to be brought under fully irrigated condition is 123,330 ha; and irrigated area to be stabilized is 92,500 ha at the end of the project period (T-2). This includes 80,680 ha of gap ayacut under the tanks to be brought under full irrigation

coverage and 60510 ha of partially irrigated area under the tanks to be stabilized by the project. Diversified area would account for 32% of the land area; an increase of 30% over the WOP situation. Cropping intensity would increase from 103% under WOP to 121% when full project development takes place. Crop diversification in the project area would increase the area under fodder by 268%, cotton by 103%, sugarcane by 50%, fruits and vegetables by 50%, oilseeds by 27% and pulses by 12%. Area under technological interventions would increase the over all weighted average crop productivity (T-2) by 30 to 100% and/or reduce the cost of production by 5 to 10% in major focus crops at the end of the project period. At full project development, SRI techniques in paddy would cover one-third of the paddy area in the project sub-basins; micro irrigation like drip or sprinkler would cover 50 to 70% of the area under major crops like maize, groundnut, coconut, sugarcane and fruits and vegetable crops.

6. Fisheries Fish productivity improvement activities, accounting for about 1% of the project cost, are targeted through aquaculture in farm ponds, stock and harvest in short seasonal irrigation tanks and ornamental fish culture. Seed banks

and cage units are proposed in the sub-basins to meet the incremental demand of 40 million fish fingerlings. The main benefit considered is increase in per hectare fish productivity following investments in farm ponds and irrigation tanks (T-3). Separate models for farm ponds (150 ha of WSA proposed), short seasonal tanks (77,880 ha of WSA proposed), fish seed banks (51,610 sq.m of WSA proposed), fish seed cages (180 cages proposed) and ornamental fish culture (120,000 sq.m proposed) were prepared to capture the incremental benefits of the proposed interventions. Productivity levels for with and without project situations are based on data from sample surveys of ongoing state fisheries department schemes and other published sources (T-3). Incremental net benefits were estimated for farm ponds, short seasonal tanks and ornamental fish culture separately and aggregated using the area proposed under each of these models. The project would incrementally produce 22,500 tonnes of inland fish (accounting for 15% of annual inland fish production in the state) valued at Rs 540 million after the full implementation of the fisheries related activities by project-ending period.

7. Livestock Livestock development activities, accounting for about 2% of the project cost, are focused on improving breed, feed and health care management in the project

sub-basin areas. For breed improvement and health care services, about 137 mobile units are proposed to be located in the project sub-basins. At full development, 526,010 AIs would be

**T-2: Weighted average of crop yields (tons/ha)**

Crops	Without project	With project
Paddy	4.2	5.4
Sugarcane	96.5	128
Coconut (nuts)	15420	21760
Groundnut	2.0	3.0
Maize	2.0	3.9
Fruits	7.6	10.7
Vegetables	8.8	12.4
Pulses	0.49	0.69

**T-3: Weighted average fish productivity (t/ha of WSA)**

Models	WOP	WP
Farm Pond Aquaculture	NA	6.0
Short Seasonal Irrigation Tanks	0.1	0.4

**T-4: Weighted average milk productivity (l/cow/day)**

Models	WOP	WP
Cross bred cows	4.5	11.2

incrementally performed in the project sub-basins, resulting in about 166,000 lactating cross-bred cattle in the project sub-basin area. To supplement the incremental demand for green fodder, 6,500 ha area is allocated for green fodder crops in the sub-basin model cropping pattern. Based on the existing cross bred cattle composition and milk productivity and potentials for enhancing the productivity, three groups of sub-basins were considered before aggregating the benefits for the project as a whole. Incremental milk production in the project area would reach 587 million litres annually at full project development stage to be reached in year.10. Introduction of one cross bred cattle in one farm family would generate an incremental financial income of Rs 5 ,300 which in itself is adequate to take one member of the farm family above poverty line threshold level of per capita income. Other parameters relevant for the project analysis are; conception rate to improve from 40% (WOP) to 50% (WP), calf mortality at 10% and hybrid sterility at 5%, adult mortality at 5%, lactation period at 300 days and milk price at Rs 9 per litre. The overall incremental milk production growth would ensure an annual growth of 10% in the project sub-basins while the trend growth in milk production in the state is over 4% now. By the end of the project period, the annual incremental production from all the project sub-basins would account for over 10% of the state level milk production.

#### *Project Costs*

8. All project costs, including contingencies, of the main project components namely; irrigated agriculture modernization and water resources management are included for estimation of the project's internal rate of return. In estimating rates of return on individual activities, capital costs as well as all O&M costs are included. For irrigated agriculture, livestock and fisheries all project related costs are included in the analysis. Incremental maintenance costs are provided for after the project period based on the provision made for the last year of the project. For the analysis of the project as a whole, total project costs (including for project management, etc.) were included.

#### *Economic Analysis*

9. Economic Prices. For traded commodities (e.g., rice, maize, sugar, groundnut, fertilizers), economic prices were estimated based on import/export parity levels. For all non-tradable commodities, including labor, a standard conversion factor (SCF) of 0.9 was used to estimate economic costs and benefits. In the case of rice, since India is neither a

**T-5 Summary of Project Economic Analysis (Rs Million)**

<b>Sub-basins</b>	<b>PVC</b>	<b>PVB</b>	<b>NPV</b>	<b>ERR</b>
Varahanadhi	710	1341	631	26.4%
Upper Vellar	365	776	411	28.4%
South Vellar	559	611	52	13.5%
Pambar	506	622	116	15.7%
Kottakarayar	510	540	30	13.0%
Manimuthar	468	530	62	14.2%
Arjunanadhi	359	624	266	23.2%
Palar (PAP)	2102	3867	1765	24.9%
Aliyar (PAP)	448	1005	557	30.2%
<i>9 Sample Sub-basins</i>	<i>6,027</i>	<i>9,917</i>	<i>3,891</i>	<i>22.1%</i>
<b>Overall Project</b>	<b>17,308</b>	<b>25,870</b>	<b>8,561</b>	<b>20.4%</b>

consistent exporter nor importer but keeps varying between the two, the economic price used was the average of the export parity and import parity levels. For all other crops like fruits and vegetables, which are produced in limited quantities in the project area, world market reference prices were not available and hence these crops were treated as non-tradable and their economic prices were derived using the SCF.

10. Economic Rate of Return. This is based on the analyses of nine sample sub-basin investment proposals spread over four agroclimatic regions. For individual sub-basins, the ERR varied from 13 to 30.2% with the overall ERR for the nine sample sub-basins working out to 22.1% (T-5). By projecting the incremental benefits and costs from these sample sub-basins for

all the 63 project sub-basins aggregated by agroclimate and hydrology based sub-basin clusters, over all ERR for the project including all component costs is estimated to be 20.4%. The project is expected to yield a net present value of Rs. 8.6 billion (in 2006 prices) over a 25-year project cycle.

### Financial Analysis

11. Financial analysis using financial prices was carried out for the entire project. Assumptions for estimating incremental project benefits were the same as those used for the economic analysis. The estimated FRR for the project is 23% with NPV of Rs. 12.4 billion at 2006 prices over a project cycle of 25 years (T-6). The main difference between the project FRR and the ERR is due largely to the difference between the financial and economic prices of

**T-6 Summary of Project Financial Analysis (Rs Million)**

Sub-basins	PVC	PVB	NPV	ERR
Varahanadhi	757	1694	937	30.8%
Upper Vellar	405	1007	601	33.5%
South Vellar	621	723	102	14.7%
Pambar	563	799	236	18.7%
Kottakarayar	566	643	77	14.2%
Manimuthar	520	698	178	17.5%
Arjunanadhi	398	784	386	26.6%
Palar (Coimbatore)	2335	4550	2214	26.5%
Aliyar (Coimbatore)	498	1188	690	32.3%
<i>9 Sample Sub-basins</i>	<i>6,664</i>	<i>12,086</i>	<i>5,421</i>	<i>24.5%</i>
<b>Overall Project</b>	<b>19,232</b>	<b>31,591</b>	<b>12,359</b>	<b>23.0%</b>

internationally tradable commodities and inputs. Financial analysis was done for the livestock mobile units from the beneficiary perspective to assess the sustainability of this intervention. One unit is proposed for the unserved (by the existing veterinary centres) population of 5000 breedable cattle to be operated and managed by a trained Veterinary doctor. Expected AIs will gradually increase and cross 3000 per year from year 3 onwards. While 1000 AI per year would break-even, 3,000 AI per year, inclusive of other charges, would provide him a monthly income of over Rs 5,000 from year.3 onwards which is considered sufficient to ensure the unit's sustainability.

### Sensitivity Analysis

12. Sensitivity analysis is performed for ERR for different scenarios. A 50% increase in costs, or a 33% decrease in benefits, or a combined 20% increase in costs together with 20% decrease in benefits, reduces the project ERR to 12%. Even when a combined scenario of reduced benefits levels and increased cost levels are considered to simultaneously occur, ERR declined to the lowest level but still remained same as opportunity cost of capital. When the realization of benefits is lagged by one year, ERR came down to 16.7% with around one-third reduction in the NPV as compared to the base year. The outcome of sensitivity analysis underlines the critical role of agriculture intensification and diversification as well as timely execution of project investments to realize the incremental benefits in making the project viable.

### T-7 Sensitivity analysis summary

Scenarios for the project	ERR (%)	NPV-25 yrs, 2006 prices, Rs billion	FRR (%)	NPV-25 yrs, 2006 prices, Rs billion
Base Level	20.4%	8.6	23.0%	12.4
Escalation in costs				
Costs at 120% of the base level	16.3%	5.1	18.4%	8.5
Costs at 150% of the base level	12.0%	0.0	13.7%	2.7
Risks in irrigated area expansion and agriculture support				
Benefits at 80% of the base level	15.4%	3.4	17.5%	6.0
Benefits at 67% of the base level	12.0%	0.0	13.8%	1.9
Cost escalation and risk in benefit realization combined				
Costs at 120% and benefits at 80% of base level	12.0%	0.0	13.7%	2.2
Delayed implementation				
Benefit lagged by one year	16.7%	5.6	18.6%	8.7

Incentives for Agriculture Intensification and Diversification. The project targets to cover 66,500 ha under SRI technique in paddy and introduce micro-irrigation techniques like drip with fertigation and sprinkler systems in 80,200 ha with high-value crops by the project-ending period. The limited spread of these techniques (drip and sprinkler in particular), is currently subsidy-led with little technological-institutional back-up mechanism in place at the field level. In the project sub-basins, it is targeted to scale up the adoption of irrigation water saving technologies to cover more crops in larger areas within the existing investment subsidy framework. Specifically, the project is designed to link it with the proposed irrigation system modernization investment interventions and offer it as a package, wherever appropriate. After modernization, large-scale demonstrations of improved water management, water savings, increased irrigation coverage, WUA-led participatory system management, enhanced cropping intensity, productivity and income would enable additional WUAs/farmer groups to further scale-up the adoption of these technologies. Incremental net benefits from such water use efficient technologies range from Rs 4,000 to 6,000 per ha for paddy, maize, cotton and groundnut; Rs 10,000 to 15,000 per ha for sugarcane, vegetables and fruits; and Rs 20,000 for plantation crops providing economic incentive for farmers. Other WUA-centered interventions like CWUAVU for livestock development, fish seed banks for income generation and farm ponds for intensive aquaculture would provide additional incentives for scaling up these technologies in the project sub-basins.

### Project Impacts

13. Farm income, production and employment. At full development, the project is expected to increase annually the crop production of major crops/commodities such as food grains (340,000 t), oilseeds (407,720 t), pulses (10,700 t), fruits and vegetables (365,000 t), sugarcane (2,083,300 t), green fodder (1,032,600 t), milk (587,000 t) and inland fish (22,500 t). The net present incremental financial benefits arising from incremental agricultural production will be Rs 12.4 billion in 2006 prices (T-7). It is estimated that around 50,000 rural farm jobs will be created annually following the implementation of the project. Average farm income for one ha holding farmer is estimated to increase by about Rs 11,500 per year at full development, and about 56,000 rural poor farm households in the project sub-basins are expected to be benefited.

14. Incremental Revenue. Following the implementation of project, potential sources of revenue that would accrue directly to the Government is shown in the table below.

**T-8 Potential incremental revenue beyond the project completion ( in million Rs.)**

No.	Sources	Yr.1	2	3	4	5	Beyond Y.6
1	Incremental revenue from mandi taxes <sup>@</sup>	0	18	35	53	73	92
2	Incremental revenue from water charges <sup>#</sup>	0	10	19	29	41	51
3	Incremental revenue from improved collection rate due to improved institutional functioning in project area <sup>@@</sup>	0	39	78	117	163	204
	<b>Total</b>	<b>0</b>	<b>66</b>	<b>133</b>	<b>199</b>	<b>276</b>	<b>346</b>

<sup>@</sup> Based on aggregated sub-basin models, annual Incremental benefits from year.10 onwards is projected at Rs 10.2 billion. Market arrival at 60% across crops and average *mandi* tax/cess at 1.5%.

<sup>#</sup> Incremental irrigated area of 123330 ha in the project area to be charged average additional water rate of Rs 163/ha; to be shared between WRO (70%) and WUA (30%) and Rs 250/ha (average) to be charged by WUA.

<sup>@@</sup> For the remaining fully/partially irrigated area of 493330 ha, water charges were taken at Rs 413/ha.

## Annex 10: Safeguard Policy Issues

### INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project

The IAMWARM project proposes to strengthen institutions for irrigated agriculture service delivery and for sustainable water resources management as well as finance investments to improve the productivity of water in selected sub-basins in Tamil Nadu.

The project offers many opportunities to enhance the environment and social development, and also has some social and environmental risks that need to be effectively managed to achieve sustainable project outcomes.

The key environmental and social management issues associated with the project include:

- Need to strengthen institutional capacity in project-related institutions (MDPU, WRO, SWaRMA, other line agencies) to mainstream environmental and social considerations
- Need to improve knowledge base and analytical capacity on environment and social issues
- Need to improve implementation of participatory approaches (at WUA, sub-basin, and basin-levels) to improve awareness, generate effective participation, and assume increasing responsibility for decisions
- Improve positive environmental and social benefits and effectively address any negative impacts associated with physical investments

Project activities have been examined in detail from a safeguard viewpoint (see below).

<b>Policy</b>	<b>Applicability</b>	<b>Comments</b>
Environmental Assessment (OP/BP 4.01)	Yes	Significant adverse social or environmental impacts are not expected as all significant physical investments are expected to be in the nature of rehabilitation of existing assets. However, an integrated Environmental and Social Assessment (ESA) with an Environmental and Social Management Framework (ESMF) to both manage risks and maximize environmental and social opportunities has been finalized based on earlier work and experiences of the TN WRCP project and consideration of new activities proposed in the TN IAMWARM project.
Natural Habitats (OP/BP 4.04)	No	No adverse impacts on natural habitats expected, but this issue will be further tracked during the ESA implementation
Forests (OP/BP 4.36)	No	No proposed activities would trigger this policy.
Pest Management (OP 4.09)	Yes	No pesticides and fertilizers are expected to be financed directly by the project except in the case of demonstrations; however, there may be induced impacts of increased fertilizer and pesticide use due to improved agricultural intensification and diversification. The project will support scaling-up statewide Integrated Pest Management and Integrated Nutrient Management efforts and support for safer and organic food production and marketing. A pest management plan has been developed as part of the ESA and ESMP.
Cultural Property (OPN 11.03)	Yes	No significant adverse impacts on cultural property expected, but this issue will be examined during the ESA (particularly in relation to proper management of any religious and other physical cultural property associated with tanks during rehabilitation).
Indigenous Peoples (OD 4.20)	No	No adverse impacts on tribals are expected, but the project will examine ways to improve benefits to tribals, women, and other vulnerable groups as part of the ESA.

Involuntary Resettlement (OP/BP 4.12)	Yes	No significant resettlement expected – but these will be examined further as preparation proceeds. The successful arrangements adopted under the previous TN WRCP project will also be adopted as required.
Safety of Dams (OP/BP 4.37)	Yes	The project will support safety of dams associated with the project areas (unless already addressed under other parallel projects). The project will also support safety improvement of tank systems as part of tank rehabilitation.
Projects on International Waterways (OP/BP 7.50)	No	No project activities in international waterways.
Projects in Disputed Areas (OP/BP 7.60)	No	No project activities in disputed areas.

Given that the physical investments will be focused on modernization of existing assets, the project is not expected to result in major adverse impacts. However, due to the large scale of the project and number of safeguard policies triggered, the project has been classified as a Category A project. A detailed Environmental and Social Assessment has been conducted for this project. Extensive consultation has been undertaken as part of the assessment and a strong consultative framework has been built into the project to allow for stakeholder views to be better reflected in the project design and implementation. A Social and Environmental Management Framework has been developed to mainstream these issues in different stages of Sub-Basin physical investments.

<b>Stage</b>	<b>Environmental and Social Implications</b>
<b>Pre-Planning</b>	<ul style="list-style-type: none"> <li>▪ Collation of available social and environmental information (incl. on demography, water uses, pollution, resource management, sand mining, etc.)</li> <li>▪ Preparation of thematic maps on environmental and social issues</li> <li>▪ Initial consultations with various groups to determine key project stakeholders</li> </ul>
<b>Planning</b>	<ul style="list-style-type: none"> <li>▪ Consultations on issues and options (ensuring participation of all key stakeholders)</li> <li>▪ Participatory development (with analytical input) of Sub-basin Development and Management Plans and procurement documents</li> <li>▪ Facilitation of participatory drafting of MOU</li> </ul>
<b>Appraisal</b>	<ul style="list-style-type: none"> <li>▪ Gender</li> <li>▪ Tribal Development</li> <li>▪ Pest Management</li> <li>▪ Natural Habitats</li> <li>▪ Land acquisition/R&amp;R</li> <li>▪ Participatory Irrigation Management</li> <li>▪ Construction-related</li> </ul>
<b>Implementation</b>	<ul style="list-style-type: none"> <li>▪ Community involvement in contracting and supervision</li> <li>▪ Monitoring any unforeseen environmental or social impacts</li> </ul>
<b>Post-Implementation</b>	<ul style="list-style-type: none"> <li>▪ Identify linkages and further work to improve social and environmental sustainability</li> <li>▪ Reflect environmental and social issues in the sub-basin Implementation Completion Report</li> </ul>

The project proposes the following activities aimed at building social capital, environment awareness, and institutional capacity to address the following issues:

- **Participation and Inclusion:** The project will support Water User Association formation and strengthening in the command areas of the project sub-basins in accordance with the TNFMIS Act. Particular emphasis would be made to improve the effective participation of women. The participation of farmers and other stakeholders during project activity design will be ensured by all line departments in designing sub-basin plans. WUA representatives will be full members of the Basin Boards to be supported under the project to improve farmer participation at higher levels of decision-making. For this purpose, effective participation and analytical tracks will be combined to support decisions at a Basin-level, building on previous experience with Strategic Environmental Assessment in the Palar Basin.
- **Improving farmer ability at agribusiness:** The key focus of the project is on improving incomes from every drop of water used for irrigation. To do this, it is critical that the ability of farmers to undertake agribusiness in coordination with all such individuals and institutions in the private and public sector is facilitated. The project would aim to build the capacity of government line departments to effectively act as facilitators in helping link up farmers and their WUAs with institutions such as the Agriculture Technology Management Agencies (ATMAs), private sector agribusiness, agro-processing and marketing agencies, agricultural universities etc. A systematic approach to building farmer ability at undertaking agribusiness starting from cropping decisions to use of appropriate inputs, technology, marketing channels in coordination with the best agencies in each of these aspects would be one of the key thrusts of the project.
- **Community capacity building:** The community capacity-building component would focus on the setting up of water management and financial management systems at the WUA level, helping WUAs become more transparent and accountable. The project proposes to contract NGOs/CSOs with experience of providing client need-based and demand-driven support with appropriate institutional mechanisms. The associated training and other capacity-building programs are aimed at improving social capital of the farmers in assuming more responsibility.
- **Change Management.** One issue that has remained the focus since the TNWRCP, is the importance of changing the mindset amongst government officials of the WRO to better mainstream environmental and social issues. In the multidisciplinary approach (especially the formulation of MDPU) of the proposed project, Agriculture, Horticulture, Agriculture Engineering, Agriculture Marketing, Fisheries and Animal Husbandry department are actively involved. It is critical that these line departments are able to function as effective facilitators who can link farmers/communities and their WUAs effectively with a range of service providers both in the public and private sectors. For this, a number of alternative and innovative capacity building interventions will be designed, piloted and institutionalized through the project. This will include observation study tours, stakeholder workshops, and Human Resource Development Programs covering results-based management, participatory monitoring and learning, leadership and team building, conflict management etc. The Environmental Cells and PIM Cell at the WRO will be strengthened to facilitate this process.
- **Improving the Knowledge Base, Analytical Capacity, and Awareness-building:** The project will place a special focus on improving the knowledge base and analytical capacity to address water resource and irrigated agriculture related social and environmental issues in the state. This will include strengthening the environmental and social geospatial information base for water resources management (especially in SWaRMA), as well as for the targeted water productivity improvements (through the Information Management System, M&E consultancy, and other line agency support). It is also proposed that products and processes to improve environmental and social

awareness be produced as required (these will include State of the Basin Reports/Atlases, structured stakeholder processes, etc. aimed at improving information flow, building a shared development vision, and creating improved convergence of services). Benchmarking techniques would be used to recognize better performers (e.g. at WUA level) on environmental and social issues. Targeted research on a number of social and environmental issues would be supported under the project's Water Resources Research Fund.

- **Effectively addressing project social and environmental risks:** Integrated Pest Management and Integrated Plant Nutrient Management have been mainstreamed throughout the project demonstrations. No adverse impacts are expected on tribal/indigenous communities and the ESA has identified possible ways of enhancing the positive impacts of project activities on tribal communities where they exist in the project area. Even though, *prima facie*, there is no major land acquisition or resettlement and rehabilitation expected under the project, the ESA provides a detailed framework and guidelines for implementing, Land Acquisition and Resettlement and Rehabilitation that is built on the good practice examples set under the TNWRCP - the predecessor project. If and when required, this framework shall be used. Promotion of organic and low -input cultivation and marketing will be made during the project to improve sustainability and explore emerging market niches. Sub-basins such as the Cooum in the Chennai Region will be of particular focus to improve its critical environmental aspects. Cells to manage environment, social, and participatory irrigation management will be strengthened during project implementation. Monitoring and Evaluation Indicators have been developed to ensure implementation of environmental and social elements that have been built into all the stages of the project. The Dam Safety management capacity of WRO would also be strengthened as part of the project. Involvement of farmers in all system modernization would include identification and effective management of any sensitive associated physical cultural property that may be impacted (e.g. any small temples/idols on tank bunds). Training programs for farmers and staff have been included in the project to improve awareness of modern irrigated agriculture/horticulture technologies, agricultural marketing, modern sustainable fisheries, and on-farm management (with a particular focus on those that can help improve farm returns while reducing resource requirements – e.g. drip/sprinkler/SRI techniques, etc.).

These aspects have been further discussed in the Environment and Social Assessment that has been disclosed as required and has been integrated into project implementation and costing. It is expected that the implementation of the project as designed would result in economic, social, and environmental benefits to the state but particular attention to environmental and social issues should be paid to assist adaptive management during implementation to fully achieve these results.

## Annex 11: Transparency and Accountability Plan

### INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project

1. The recent enactment of the Right to Information Act (RTI) has created additional opportunities for enhancing transparency and accountability. Arrangements under this project will make use of this opportunity to enhance disclosure of information and facilitate civil society partnership resulting in increased responsiveness. The agreed action plan builds upon the numerous actions that have been agreed under this project to enhance transparency and accountability actions for procurement and other activities under the Project.
2. The key elements of this strategy include the following:
  - a) Enhance disclosure of information;
  - b) Facilitate civil society involvement
  - c) Develop a credible system to handle comments, suggestions and grievances;
  - d) Define clearly incentives and remedies available;
  - e) Develop monitoring indicators for compliance to the above agreements and for impact on outcomes

#### I. Enhanced disclosure of information

3. The project has developed the following outline of a disclosure policy that will be further fine-tuned and details developed during implementation based on the experience gained.

#### Outline of the disclosure Policy and Action Plan

4. The intent of the disclosure policy is for compliance with the RTI Act both for on-demand disclosure and *suo moto* disclosure as required. This enhanced disclosure of information to the citizens is expected to facilitate civil society partnership. However, the information needs to be maintained and provided in a manner that will maximize the utility of the information. The following table details the *suo moto* disclosures of the project.

Topics	Documents to be disclosed	Frequency	Mode
Project Scope	Project Appraisal Document of the Bank Financed project	Once when project Agreement is signed	Project website
Community and Infrastructure Development	Project Activities (Sub-basin Plans)	Annual	Project & CWUA website
Environmental Management	Environment Assessment summary	Final report has been disclosed.	1. World Bank's Info shop. 2. WRO offices
Financial Management	<u>At Project level</u> i) Project financing Plans ii) Budgetary allocation for the project iii) Progress report (financial and physical) iv) Financial Management Guidelines.	Before the start of the project yearly  Quarterly/ annually	WRO website throughout the life and updated regularly. Project website.  Department website.
Procurement	The disclosure requirements as per Bank's Procurement Guidelines (May, 2004) and Consultant Guidelines (May, 2004) will be complied.		

## **II) Facilitate civil society Involvement**

5. **Civil Society Involvement** is in built into the project's resources allocation as well as decision making both at grassroots and apex levels of implementation and the same are described below:

- i) **Demand Responsive.** – The Project is planned as a community demand responsive project wherein Sub basin Plans are formulated based on multi stakeholder consultations, joint walk-through and field-level meetings.
- ii) **WUA.** – Water Users Association are democratically elected bodies representing farmers, under the TNFMIS Act, through elections conducted by the District Collectors.
- iii) **Social Audit.** Social audits by WUA, have been provided for in project design.
- iv) **NGO/CSO participation.** Project provides for enlisting the services of CSO/NGOs for providing capacity Building & community development support to participate in all project activities
- v) **Project Committees .** There will be two committees at the implementation level. First the district level committee headed by the District Collector involving all Line Departments & Sector experts. Second would be a Sub basin Committee comprising Sub basin officials and experts and representatives of the WUAs. The Committees are involved in the preparation of detailed Sub basin plans, need assessment and execution.

## **III. System to handle comments, suggestions and grievances.**

5. A system is already in place to handle comments, suggestions and grievances. This system includes the following features:

The Tamilnadu Tender Transparency Act No.43 of 1998

The Government of Tamil Nadu has already enacted the Tamil Nadu Transparency in Tenders Act 1998 with Tender Rules 2000. The Act is aimed to provide for transparency in public procurement leading to maximum economy and efficiency in Government procurement. The objectives also include fostering and encouraging effective participation in the tenders, to promote healthy competition and to provide for fair and equitable treatment of all tenderers.

### **Redressal Mechanism:-**

As per section 10(7) The Tender Accepting Authority shall intimate the information regarding the name and address of the tenderer whose tender has been accepted along with the reasons for rejection of other tenders to the appropriate Tender Bulletin Officers. Further more as per section 11:

- (1) Any tenderer aggrieved by the order passed by the Tender Accepting Authority under section 10 may appeal to the Government within ten days from the date of receipt of order and the Government shall dispose the appeal within fifteen days from the date of receipt
- (2) In disposing of an appeal under sub-section (1), the Government may, after giving the party an opportunity of making his representations, pass such order thereon as they may deem fit.

As it is clear from the above section, there is adequate provision for proper acceptance, analysis of tenders as well as an adequate mechanism for grievance redressal. There are arrangements to provide requested information about selected tenders and the reasons for rejection of other tenders, and further, a provision for appeal to the Government against the orders of the tender-accepting authority.

Apart from this Tamil Nadu Government has a streamlined grievances redressal system present and working effectively in every Sub Basin.

The Redressal system can be accessed by any petitioner from the Civil Society or tender participants. The system includes an Office of Deputy Collector Grievance Cell at the District Collectors Office and a weekly (every Monday) grievance day during which all from Civil society can directly meet the Heads of all District Departments under the Chairmanship of the Collector to seek redressal of the grievances on the spot. Each petition is numbered and the petitioner given a receipt with the date by which a reply will be given. A database of these petitions is maintained with the collector. The petitions are monitored by the Collector, the Secretaries to Government the Heads of Department and by the Special Grievance Cell attached to Chief Ministers Office. The Project will be also adhering to these special systems in place and already functioning in Tamil Nadu.

#### **IV) Define clearly incentives and remedies available**

7. GoTN will ensure remedial actions and sanctions are pursued for cases of fraud and corruption that are reported, and for which evidence is found and charges established after due process of investigation.

8. Information regarding such cases, where lessons are learned and funds are retrieved, will be widely published for information of the members of public. Anonymity of informants will be ensured.

#### **V) Develop monitoring indicators for compliance to the above agreements and for impact on outcomes.**

9. The Bank will monitor implementation of these elements, through inter alia:

a) Disclosure of information will be reviewed mainly through (a) checking the frequency and comprehensiveness of website updates and, (b) checking the distribution of information to WUAs (c) checking the comprehensiveness of information available at public information Kiosks.

b) Civil society involvement will be supervised through reviewing the reported inclusion of Water User Associations (WUAs) in project activities, particularly their roles in monitoring procurement and construction. More precise indicators shall be developed during the first year of project implementation phase.

c) The complaints handling system and the system of sanctions and remedies will be supervised mainly through (a) periodic review of statistics based on records kept on the project website and (b) field level checks to ensure that problems are being reported and acted upon.

## Annex 12: Project Preparation and Supervision

### INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project

	<b>Planned</b>	<b>Actual</b>
PCN review	November 17, 2005	November 17, 2005
Initial PID to PIC	November 24, 2005	December 5, 2005
Initial ISDS to PIC	December 9, 2005	February 7, 2006
Appraisal	November 17, 2006	November 17, 2006
Negotiations	December 11, 2006	December 11, 2006
Board/RVP approval	January 25, 2007	
Planned date of effectiveness	March 1, 2007	
Planned date of mid-term review	September, 2009	
Planned closing date	March 31, 2013	

#### **Key institutions responsible for preparation of the project:**

Multi-Disciplinary Project Unit (MDPU), with representatives from the Water Resources Organization (WRO), Agriculture Department, Agricultural Engineering Department, Agricultural Marketing Department, Horticulture Department, Animal Husbandry Department, Fisheries Department, Tamil Nadu Agricultural University (TNAU), Institute for Water Studies (IWS), State Surface and Groundwater Data Center, Information Technology Department, under the guidance of department secretaries and Ministers.

#### **Bank staff and consultants who worked on the project included:**

<b>Name</b>	<b>Title</b>	<b>Unit</b>
Srinivasan Raj Rajagopal	Lead Water Resources Specialist (Task Team Leader)	SASSD
Nagaraja Rao Harshadeep	Senior Environmental Specialist (Co-Task Team Leader)	SASSD/AFTNL
Shankar Narayanan	Senior Social Development Specialist	SASSD
S. Selvarajan	Economist	FAOCP Consultant
Graham Dixie	Sr. Agricultural Marketing Specialist	SASSD
Willem Janssen	Senior Agriculture Specialist	SASSD
Rabih Karaky	Economist	SASSD
Vinayak Ghatate	Livelihoods Specialist	SASSD
Mohan Gopalakrishnan	Senior Financial Mgmt. Specialist	SARFM
Sushil Kumar Bahl	Senior Procurement Specialist	SARPS
Javier Zuleta	Senior Irrigation Engineer	SASSD
Shashank Ojha	Senior IT Specialist	ISGIA
Philip Beauregard	Senior Legal Counsel	LEGMS
Syed I. Ahmed	Lead Legal Counsel	LEGMS
Gennady Pilch	Senior Legal Counsel	LEGEN
Thao LeNguyen	Senior Finance Officer	LOAG2
Winston Yu	Young Professional/Modeling	AFTNL (formerly in SAR)
Deborah Lee Ricks	Program Assistant	SASSD
Vinod Kumar Garg	Procurement Specialist	FAOCP Consultant
Jagdish Anand	IT Specialist	FAOCP Consultant
Cossio Ferdinando	Horticulture Consultant	FAOCP Consultant

**Bank funds expended to date on project preparation:**

1. Bank resources:	US\$ 524,000
2. Trust funds:	US\$ 0
3. FAOCP	US\$ 156,000
4. Total:	US\$ 680,000

**Estimated Approval and Supervision costs :**

1. Remaining costs to approval:	US\$35,000
2. Estimated annual supervision cost:	US\$80,000 BB US\$80,000 FAOCP

### **Annex 13: Documents in the Project File**

#### **INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project**

1. Project Concept Note
2. Environmental and Social Assessment for River Basins of Tamil Nadu
3. Sub-Basin Plans for Palar Sub-Basin of Parambikulam Aliyar Project
4. Sub-Basin Plans for Aliyar Sub-Basin of Parambikulam Aliyar Project
5. Sub-Basin Plans for Vasishtanadhi Sub-Basin
6. Sub-Basin Plans for South Vellar Sub-Basin
7. Sub-Basin Plans for Pambar Sub-Basin
8. Sub-Basin Plans for Kottakarayar Sub-Basin
9. Sub-Basin Plans for Manimuthar Sub-Basin
10. Sub-Basin Plans for Arjunanadhi Sub-Basin
11. Detailed Project Report for Palar Sub-Basin of Parambikulam Aliyar Project
12. Detailed Project Report for Aliyar Sub-Basin of Parambikulam Aliyar Project
13. Detailed Project report for Vasishtanadhi Sub-Basin
14. Detailed Project report for South Vellar Sub-Basin
15. Detailed Project report for Pambar Sub-Basin
16. Detailed Project Report for Kottakarayar Sub-Basin
17. Detailed Project Report for Manimuthar Sub-Basin
18. Detailed Project report for Arjunanadhi Sub-Basin
19. Agricultural Interventions report for the above nine sub-basins
20. Animal Husbandry Interventions report for the above nine sub-basins
21. Fisheries Development report for the above nine sub-basins
22. Agricultural Marketing Interventions report for the above nine sub-basins
23. Horticulture Department Report for the above nine sub-basins
24. Tamil Nadu Agricultural University component report for the above nine sub-basins
25. Tamil Nadu Farmers Management of Irrigation Systems Act
26. Tamil Nadu State Water Policy
27. Tamil Nadu Groundwater Act
28. Government Order to Bifurcate PWD to WRO and Buildings Organization
29. Public Expenditure Review of the Irrigation Sector
30. IAMWARM Project Operations Manual

## Annex 14: Statement of Loans and Credits

### INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project

Project ID	FY	Purpose	Original Amount in US\$ Millions						Difference between expected and actual disbursements	
			IBRD	IDA	SF	GEF	Cancel.	Undisb.	Orig.	Frm. Rev'd
P090592	2007	Punjab Rural Water	0.00	154.00	0.00	0.00	0.00	154.00	0.00	0.00
P090585	2007	Punjab State Roads	250.00	0.00	0.00	0.00	0.00	250.00	0.00	0.00
P097036	2007	Orissa Socio-Econ Dev Loan II	150.00	75.00	0.00	0.00	0.00	124.15	-100.00	0.00
P071160	2007	Karnataka Health Systems	0.00	141.83	0.00	0.00	0.00	141.61	0.00	0.00
P075060	2007	RCH II	0.00	360.00	0.00	0.00	0.00	363.72	0.00	0.00
P078539	2007	TB II	0.00	170.00	0.00	0.00	0.00	171.18	0.00	0.00
P083187	2007	Uttaranchal RWSS	0.00	120.00	0.00	0.00	0.00	124.03	0.00	0.00
P078832	2006	Karnataka Panchayats Strengthening Proj	0.00	120.00	0.00	0.00	0.00	121.43	0.00	0.00
P079675	2006	Karn Municipal Reform	216.00	0.00	0.00	0.00	0.00	205.00	-3.97	0.00
P079708	2006	TN Empwr & Pov Reduction	0.00	120.00	0.00	0.00	0.00	111.10	-3.60	0.00
P083780	2006	TN Urban III	300.00	0.00	0.00	0.00	0.00	268.54	14.29	0.00
P093720	2006	Mid-Himalayan (HP) Watersheds	0.00	60.00	0.00	0.00	0.00	54.12	-1.20	0.00
P092735	2006	NAIP	0.00	200.00	0.00	0.00	0.00	184.58	-17.00	0.00
P091453	2006	VSBK Cluster Project	0.00	0.00	0.00	0.00	0.00	2.88	0.00	0.00
P090163	2006	FALG Brick Project	0.00	0.00	0.00	0.00	0.00	4.40	0.00	0.00
P086414	2006	Power System Development Project III	400.00	0.00	0.00	0.00	0.00	400.00	0.00	0.00
P086518	2005	IN SME Financing & Development	120.00	0.00	0.00	0.00	0.00	19.40	11.07	0.00
P084792	2005	Assam Agric Competitiveness	0.00	154.00	0.00	0.00	0.00	142.14	22.36	0.00
P084632	2005	Hydrology II	104.98	0.00	0.00	0.00	0.00	104.45	35.45	1.79
P077977	2005	Rural Roads Project	99.50	300.00	0.00	0.00	0.00	241.08	-43.15	0.00
P077856	2005	Lucknow-Muzaffarpur National Highway	620.00	0.00	0.00	0.00	0.00	508.01	-15.33	0.00
P084790	2005	MAHAR WSIP	325.00	0.00	0.00	0.00	0.00	292.70	-12.63	0.00
P075058	2005	TN HEALTH SYSTEMS	0.00	110.83	0.00	0.00	20.06	82.62	14.73	16.24
P073651	2005	DISEASE SURVEILLANCE	0.00	68.00	0.00	0.00	0.00	60.98	17.25	0.00

P073370	2005	Madhya Pradesh Water Sector Restructuring	394.02	0.00	0.00	0.00	0.00	368.52	48.38	0.00
P094513	2005	India Tsunami ERC	0.00	465.00	0.00	0.00	0.00	401.40	192.62	0.00
P050655	2004	RAJASTHAN HEALTH SYSTEMS DEVELOPMENT	0.00	89.00	0.00	0.00	0.00	72.73	37.40	0.00
P082510	2004	Karnataka UWS Improvement Project	39.50	0.00	0.00	0.00	0.00	20.52	11.09	0.00
P079865	2004	GEF Biosafety Project	0.00	0.00	0.00	1.00	0.00	0.63	0.59	0.00
P073369	2004	MAHAR RWSS	0.00	181.00	0.00	0.00	0.00	92.37	-16.21	0.00
P078550	2004	Uttar Wtrshed	0.00	69.62	0.00	0.00	0.00	62.53	-0.32	0.00
P073776	2004	ALLAHABAD BYPASS	240.00	0.00	0.00	0.00	0.00	138.27	74.27	0.00
P050649	2003	TN ROADS	348.00	0.00	0.00	0.00	0.00	256.73	78.10	0.00
P076467	2003	Chatt DRPP	0.00	112.56	0.00	0.00	20.06	80.45	40.40	0.00
P067606	2003	UP ROADS	488.00	0.00	0.00	0.00	0.00	313.13	162.15	0.00
P075056	2003	Food & Drugs Capacity Building Project	0.00	54.03	0.00	0.00	0.00	42.65	23.81	0.00
P071272	2003	AP RURAL POV REDUCTION	0.00	150.03	0.00	0.00	0.00	32.06	-1.17	0.00
P072123	2003	Tech/Engg Quality Improvement Project	0.00	250.00	0.00	0.00	40.11	124.64	33.32	-46.90
P073094	2003	AP Comm Forest Mgmt	0.00	108.00	0.00	0.00	0.00	53.72	0.20	0.00
P050647	2002	UP WSRP	0.00	149.20	0.00	0.00	40.11	97.21	109.49	0.00
P071033	2002	KARN Tank Mgmt	0.00	98.90	0.00	0.00	25.07	56.78	50.55	-1.10
P050653	2002	KARNATAKA RWSS II	0.00	151.60	0.00	0.00	15.04	75.33	52.98	0.00
P050668	2002	MUMBAI URBAN TRANSPORT PROJECT	463.00	79.00	0.00	0.00	0.00	373.78	194.89	0.00
P074018	2002	Gujarat Emergency Earthquake Reconstruct	0.00	442.80	0.00	0.00	80.23	135.94	142.89	20.09
P072539	2002	KERALA STATE TRANSPORT	255.00	0.00	0.00	0.00	0.00	124.89	30.22	0.00
P040610	2002	RAJ WSRP	0.00	140.00	0.00	0.00	15.04	78.77	44.52	0.00
P069889	2002	MIZORAM ROADS	0.00	60.00	0.00	0.00	0.00	30.94	9.02	0.00
P010566	2001	Gujarat Highways	381.00	0.00	0.00	0.00	101.00	31.91	132.91	10.39
P059242	2001	MP DPIP	0.00	110.10	0.00	0.00	20.06	9.84	16.79	-10.09
P071244	2001	Grand Trunk Road Improvement Project	589.00	0.00	0.00	0.00	0.00	202.42	202.42	0.00
P050658	2001	TECHN EDUC III	0.00	64.90	0.00	0.00	0.00	8.16	1.94	-5.58
P055455	2001	Rajasthan DPEP II	0.00	74.40	0.00	0.00	0.00	26.15	16.11	0.00

P055454	2001	KERALA RWSS	0.00	65.50	0.00	0.00	12.27	12.28	12.93	2.21
P067216	2001	KAR WSHD DEVELOPMENT	0.00	100.40	0.00	0.00	20.06	47.44	51.37	34.51
P070421	2001	Karnataka Highways	360.00	0.00	0.00	0.00	0.00	63.15	56.48	0.00
P059501	2000	TA for Econ Reform Project	0.00	45.00	0.00	0.00	12.03	16.81	24.87	4.22
P050657	2000	UP Health Systems Development Project	0.00	110.00	0.00	0.00	30.09	34.80	54.77	4.49
P049770	2000	REN EGY II	80.00	50.00	0.00	0.00	18.00	33.81	49.98	48.98
P045049	2000	AP DPIP	0.00	111.00	0.00	0.00	0.00	13.50	5.09	0.00
P010505	2000	RAJASTHAN DPIP	0.00	100.48	0.00	0.00	0.00	40.59	31.42	31.44
P009972	2000	Natl Highways III	516.00	0.00	0.00	0.00	0.00	124.98	124.98	84.98
P050646	1999	UP Sodic Lands II	0.00	194.10	0.00	0.00	0.00	4.19	0.48	-5.32
Total:			6,739.00	5,780.28	0.00	1.00	469.23	7,836.14	2,020.00	190.35

**INDIA**  
**STATEMENT OF IFC's**  
**Held and Disbursed Portfolio**  
**In Millions of US Dollars**

FY Approval	Company	Committed				Disbursed			
		IFC				IFC			
		Loan	Equity	Quasi	Partic.	Loan	Equity	Quasi	Partic.
2005	ADPCL	39.50	7.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	AHEL	0.00	5.08	0.00	0.00	0.00	5.08	0.00	0.00
2005	AP Paper Mills	35.00	5.00	0.00	0.00	25.00	5.00	0.00	0.00
2005	APIDC Biotech	0.00	4.00	0.00	0.00	0.00	2.01	0.00	0.00
2002	ATL	13.81	0.00	0.00	9.36	13.81	0.00	0.00	9.36
2003	ATL	1.00	0.00	0.00	0.00	0.68	0.00	0.00	0.00
2005	ATL	9.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	Atul Ltd	16.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	BHF	10.30	0.00	10.30	0.00	10.30	0.00	10.30	0.00
2004	BILT	0.00	0.00	15.00	0.00	0.00	0.00	15.00	0.00
2001	BTVL	0.43	3.98	0.00	0.00	0.43	3.98	0.00	0.00
2003	Balrampur	10.52	0.00	0.00	0.00	10.52	0.00	0.00	0.00
2001	Basix Ltd.	0.00	0.98	0.00	0.00	0.00	0.98	0.00	0.00
2005	Bharat Biotech	0.00	0.00	4.50	0.00	0.00	0.00	3.30	0.00
1984	Bihar Sponge	5.70	0.00	0.00	0.00	5.70	0.00	0.00	0.00
2003	CCIL	1.50	0.00	0.00	0.00	0.59	0.00	0.00	0.00
2006	CCIL	7.00	2.00	0.00	12.40	7.00	2.00	0.00	12.40
1990	CESC	4.61	0.00	0.00	0.00	4.61	0.00	0.00	0.00
1992	CESC	6.55	0.00	0.00	14.59	6.55	0.00	0.00	14.59
2004	CGL	14.38	0.00	0.00	0.00	7.38	0.00	0.00	0.00
2004	CMScomputers	0.00	10.00	2.50	0.00	0.00	0.00	0.00	0.00

2002	COSMO	2.50	0.00	0.00	0.00	2.50	0.00	0.00	0.00
2005	COSMO	0.00	3.73	0.00	0.00	0.00	3.73	0.00	0.00
2006	Chennai Water	24.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	DQEL	0.00	1.50	1.50	0.00	0.00	1.50	1.50	0.00
2005	DSCL	30.00	0.00	0.00	0.00	30.00	0.00	0.00	0.00
2006	DSCL	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	Dabur	0.00	14.09	0.00	0.00	0.00	14.09	0.00	0.00
2003	Dewan	8.68	0.00	0.00	0.00	8.68	0.00	0.00	0.00
2006	Federal Bank	0.00	28.06	0.00	0.00	0.00	23.99	0.00	0.00
2001	GTF Fact	0.00	1.20	0.00	0.00	0.00	1.20	0.00	0.00
2006	GTF Fact	0.00	0.00	0.99	0.00	0.00	0.00	0.99	0.00
1994	GVK	0.00	4.83	0.00	0.00	0.00	4.83	0.00	0.00
2003	HDFC	100.00	0.00	0.00	100.00	100.00	0.00	0.00	100.00
1998	IAAF	0.00	0.47	0.00	0.00	0.00	0.30	0.00	0.00
2006	IAL	0.00	9.79	0.00	0.00	0.00	7.70	0.00	0.00
1998	IDFC	0.00	10.82	0.00	0.00	0.00	10.82	0.00	0.00
2005	IDFC	50.00	0.00	0.00	100.00	50.00	0.00	0.00	100.00
	IHDC	6.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	IHDC	7.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	Indecomm	0.00	2.57	0.00	0.00	0.00	2.57	0.00	0.00
1996	India Direct Fnd	0.00	1.10	0.00	0.00	0.00	0.66	0.00	0.00
2001	Indian Seamless	6.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00
2006	JK Paper	15.00	7.62	0.00	0.00	0.00	7.38	0.00	0.00
2005	K Mahindra INDIA	22.00	0.00	0.00	0.00	22.00	0.00	0.00	0.00
2005	KPIT	11.00	2.50	0.00	0.00	8.00	2.50	0.00	0.00
2003	L&T	50.00	0.00	0.00	0.00	50.00	0.00	0.00	0.00
2006	LGB	14.21	4.82	0.00	0.00	0.00	4.82	0.00	0.00
2006	Lok Fund	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	MMFSL	7.89	0.00	7.51	0.00	7.89	0.00	7.51	0.00
2003	MSSL	0.00	2.29	0.00	0.00	0.00	2.20	0.00	0.00
2001	MahInfra	0.00	10.00	0.00	0.00	0.00	0.79	0.00	0.00
	Montalvo	0.00	3.00	0.00	0.00	0.00	1.08	0.00	0.00
1996	Moser Baer	0.00	0.82	0.00	0.00	0.00	0.82	0.00	0.00
1999	Moser Baer	0.00	8.74	0.00	0.00	0.00	8.74	0.00	0.00
2000	Moser Baer	12.75	10.54	0.00	0.00	12.75	10.54	0.00	0.00
	Nevis	0.00	4.00	0.00	0.00	0.00	4.00	0.00	0.00
2003	NewPath	0.00	9.31	0.00	0.00	0.00	8.31	0.00	0.00
2004	NewPath	0.00	2.79	0.00	0.00	0.00	2.49	0.00	0.00
2003	Niko Resources	24.44	0.00	0.00	0.00	24.44	0.00	0.00	0.00
2001	Orchid	0.00	0.73	0.00	0.00	0.00	0.73	0.00	0.00
1997	Owens Corning	5.92	0.00	0.00	0.00	5.92	0.00	0.00	0.00
2006	PSL Limited	15.00	4.74	0.00	0.00	0.00	4.54	0.00	0.00
2004	Powerlinks	72.98	0.00	0.00	0.00	64.16	0.00	0.00	0.00
2004	RAK India	20.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00
1995	Rain Calcining	0.00	2.29	0.00	0.00	0.00	2.29	0.00	0.00
2004	Rain Calcining	10.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00
2005	Ramky	3.74	10.28	0.00	0.00	0.00	0.00	0.00	0.00
2005	Ruchi Soya	0.00	9.27	0.00	0.00	0.00	6.77	0.00	0.00
2001	SBI	50.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1997	SREI	3.21	0.00	0.00	0.00	3.21	0.00	0.00	0.00
2000	SREI	6.50	0.00	0.00	0.00	6.50	0.00	0.00	0.00
1995	Sara Fund	0.00	3.43	0.00	0.00	0.00	3.43	0.00	0.00
2004	SeaLion	4.40	0.00	0.00	0.00	4.40	0.00	0.00	0.00
2001	Spryance	0.00	1.86	0.00	0.00	0.00	1.86	0.00	0.00
2003	Spryance	0.00	0.93	0.00	0.00	0.00	0.93	0.00	0.00
2004	Sundaram Finance	42.93	0.00	0.00	0.00	42.93	0.00	0.00	0.00
2000	Sundaram Home	0.00	2.18	0.00	0.00	0.00	2.18	0.00	0.00
2002	Sundaram Home	6.71	0.00	0.00	0.00	6.71	0.00	0.00	0.00
1998	TCW/ICICI	0.00	0.80	0.00	0.00	0.00	0.80	0.00	0.00
2005	TISCO	100.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00
2004	UPL	15.45	0.00	0.00	0.00	15.45	0.00	0.00	0.00
1996	United Riceland	5.63	0.00	0.00	0.00	5.63	0.00	0.00	0.00
2005	United Riceland	8.50	0.00	0.00	0.00	5.00	0.00	0.00	0.00
2002	Usha Martin	0.00	0.72	0.00	0.00	0.00	0.72	0.00	0.00
2001	Vysya Bank	0.00	3.66	0.00	0.00	0.00	3.66	0.00	0.00
2005	Vysya Bank	0.00	3.51	0.00	0.00	0.00	3.51	0.00	0.00
1997	WIV	0.00	0.37	0.00	0.00	0.00	0.37	0.00	0.00
1997	Walden-Mgt India	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00
2006	iLabs Fund II	0.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00
Total portfolio:		956.52	249.41	42.30	536.35	604.74	175.91	38.60	236.35

FY Approval	Company	Approvals Pending Commitment			
		Loan	Equity	Quasi	Partic.
2004	CGL	0.01	0.00	0.00	0.00
2000	APCL	0.01	0.00	0.00	0.00
2006	Atul Ltd	0.00	0.01	0.00	0.00
2001	Vysya Bank	0.00	0.00	0.00	0.00
2006	Federal Bank	0.01	0.00	0.00	0.00
2001	GI Wind Farms	0.01	0.00	0.00	0.00
2004	Ocean Sparkle	0.00	0.00	0.00	0.00
2005	Allain Duhangan	0.00	0.00	0.00	0.00
Total pending commitment:		0.04	0.01	0.00	0.00

## Annex 15: Country at a Glance

### INDIA: Tamil Nadu Irrigated Agriculture Modernization and Water Resources Management Project

#### POVERTY and SOCIAL

##### 2005

	India	South Asia	Low-income
Population, mid-year (millions)	1,094.6	1,470	2,353
GNI per capita (Atlas method, US\$)	730	684	580
GNI (Atlas method, US\$ billions)	797.9	1,005	1,364

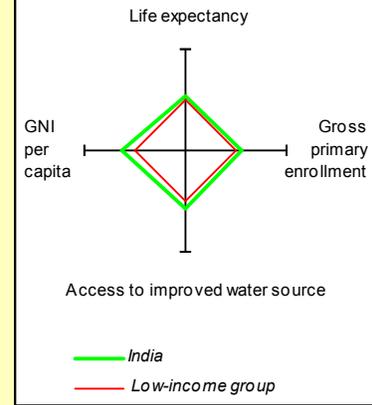
##### Average annual growth, 1999-05

	India	South Asia	Low-income
Population (%)	15	17	19
Labor force (%)	19	2.1	2.3

##### Most recent estimate (latest year available, 1999-05)

	India	South Asia	Low-income
Poverty (% of population below national poverty line)	29	..	..
Urban population (% of total population)	29	29	31
Life expectancy at birth (years)	63	63	59
Infant mortality (per 1,000 live births)	62	66	80
Child malnutrition (% of children under 5)	47	45	39
Access to an improved water source (% of population)	86	84	75
Literacy (% of population age 15+)	61	60	62
Gross primary enrollment (% of school-age population)	116	110	104
Male	120	116	110
Female	112	105	99

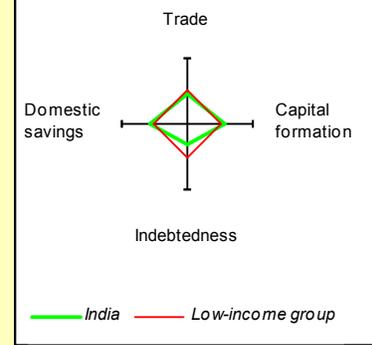
#### Development diamond\*



#### KEY ECONOMIC RATIOS and LONG-TERM TRENDS

	1985	1995	2004	2005
GDP (US\$ billions)	227.2	355.2	694.7	797.6
Gross capital formation/GDP	23.7	26.5	28.5	31.1
Exports of goods and services/GDP	5.4	11.0	18.5	20.7
Gross domestic savings/GDP	19.5	25.1	29.1	27.3
Gross national savings/GDP	19.9	26.4	31.4	29.5
Current account balance/GDP	-2.3	-1.8	-0.7	-1.3
Interest payments/GDP	0.9	1.4	0.7	0.7
Total debt/GDP	18.0	26.6	17.5	16.1
Total debt service/exports	23.0	27.8	7.5	9.1
Present value of debt/GDP	..	..	15.8	..
Present value of debt/exports	..	..	72.7	..

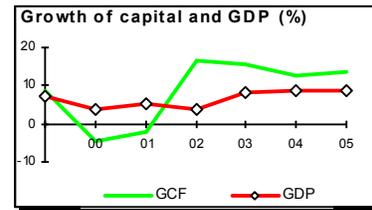
#### Economic ratios\*



	1985-95	1995-05	2004	2005	2005-09
(average annual growth)					
GDP	5.5	6.0	8.5	8.7	7.4
GDP per capita	3.4	4.3	7.0	7.2	6.0
Exports of goods and services	10.9	9.6	18.2	21.8	16.7

#### STRUCTURE of the ECONOMY

	1985	1995	2004	2005
(% of GDP)				
Agriculture	33.7	28.2	19.6	19.0
Industry	26.4	28.1	27.3	27.4
Manufacturing	16.4	18.1	16.0	15.9
Services	39.9	43.6	53.2	53.6
Household final consumption expenditure	67.4	63.8	63.5	60.5
General gov't final consumption expenditure	11.4	10.8	11.3	12.1
Imports of goods and services	7.8	12.2	21.7	24.4



	1985-95	1995-05	2004	2005
(average annual growth)				
Agriculture	3.5	2.1	0.7	3.9
Industry	6.5	5.7	8.6	8.7
Manufacturing	6.7	5.4	8.1	9.0
Services	6.7	8.1	9.9	10.0
Household final consumption expenditure	5.7	5.5	12.8	4.9
General gov't final consumption expenditure	4.2	4.7	0.0	15.6
Gross capital formation	5.4	6.6	12.8	13.4
Imports of goods and services	9.9	7.0	45.0	22.0

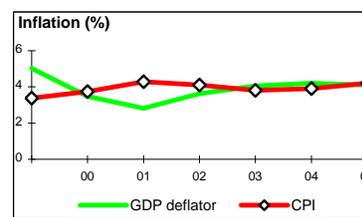


Note: 2005 data are preliminary estimates. Group data are to 2004.

\* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

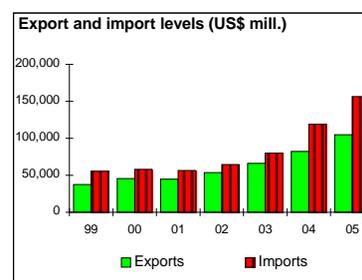
## PRICES and GOVERNMENT FINANCE

	1985	1995	2004	2005
<b>Domestic prices</b> (% change)				
Consumer prices	4.9	10.0	3.9	4.2
Implicit GDP deflator	7.2	9.0	4.2	4.1
<b>Government finance</b> (% of GDP, includes current grants)				
Current revenue	19.2	17.9	19.7	20.8
Current budget balance	-1.7	-3.1	-3.4	-2.8
Overall surplus/deficit	-8.8	-6.7	-7.7	-7.5



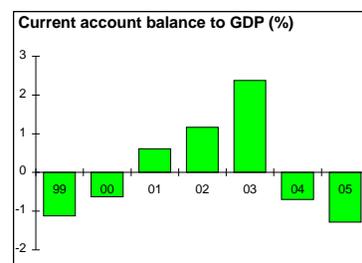
## TRADE

	1985	1995	2004	2005
<b>TRADE</b> (US\$ millions)				
Total exports (fob)	9,461	32,311	82,150	104,780
Tea	334	1,011	1,440	1,436
Iron	544	1,175	5,079	6,189
Manufactures	5,580	23,747	60,731	71,816
Total imports (cif)	17,294	43,670	118,779	156,334
Food	1,310	970	3,105	2,681
Fuel and energy	4,261	7,526	29,844	43,963
Capital goods	3,338	10,330	25,135	31,677
Export price index (2000=100)	100	106	120	130
Import price index (2000=100)	115	102	101	115
Terms of trade (2000=100)	88	103	119	113



## BALANCE of PAYMENTS

	1985	1995	2004	2005
<b>BALANCE of PAYMENTS</b> (US\$ millions)				
Exports of goods and services	12,777	39,657	128,181	165,390
Imports of goods and services	19,418	51,213	150,611	194,679
Resource balance	-6,641	-11,556	-22,430	-29,289
Net income	-776	-3,205	-2,669	-5,027
Net current transfers	2,207	8,506	20,253	24,095
Current account balance	-5,210	-6,255	-4,846	-10,221
Financing items (net)	4,639	3,319	31,618	24,874
Changes in net reserves	571	2,936	-26,772	-14,653
<b>Memo:</b>				
Reserves including gold (US\$ millions)	6,520	21,687	140,076	150,866
Conversion rate (DEC, local/US\$)	12.2	33.4	44.9	44.3



## EXTERNAL DEBT and RESOURCE FLOWS

	1985	1995	2004	2005
<b>EXTERNAL DEBT and RESOURCE FLOWS</b> (US\$ millions)				
Total debt outstanding and disbursed	40,952	94,464	121,456	128,446
IBRD	2,396	9,598	4,993	5,652
IDA	9,750	17,409	23,191	23,798
Total debt service	3,531	13,566	11,337	17,510
IBRD	313	1,320	973	1,104
IDA	124	360	785	811
Composition of net resource flows				
Official grants	349	345	591	181
Official creditors	1,421	-1,048	1,908	1,586
Private creditors	2,273	1,254	4,271	5,405
Foreign direct investment (net inflows)	0	2,057	3,240	5,733
Portfolio equity (net inflows)	0	2,748	8,907	12,489
World Bank program				
Commitments	2,882	2,078	2,886	1,416
Disbursements	1,375	2,052	2,966	3,163
Principal repayments	157	796	1,458	1,516
Net flows	1,218	1,256	1,508	1,647
Interest payments	280	884	301	400
Net transfers	938	372	1,207	1,247

