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Impact of NWMP and Tamil Nadu's WRCP (1986–2010)

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ABSTRACT

Between 1986 and 2010, India undertook significant reforms in its irrigation and water resource management sectors through the National Water Management Project (NWMP) and, specifically in Tamil Nadu, through the Water Resources Consolidation Project (WRCP). While NWMP marked the beginning of irrigation modernization, WRCP represented a paradigm shift towards integrated water resource management, basin-level planning, institutional reform, and participatory governance. This paper evaluates the impacts of these initiatives with a special focus on Tamil Nadu, where WRCP fostered the creation of the Water Resources Organisation (WRO), basin boards, the Tamil Nadu Groundwater Act (2003), and widespread engagement with Water User Associations (WUAs). Through a critical review of peer-reviewed literature and official reports up to 2010, the paper assesses achievements in physical infrastructure (canals, tanks, and field channels), institutional innovations, environmental safeguards, and social participation. Groundwater mapping, tank rehabilitation, and crop yield improvements are discussed with supporting data. While the projects succeeded in enhancing irrigation efficiency, cropping intensity, and legal frameworks, challenges remained in enforcing regulation, equitable access (especially for tail-end farmers), cost recovery, and coordination among departments. Tamil Nadu's WRCP, building on NWMP foundations, is recognized as a model for future reforms in participatory and integrated water governance. The experience underlines the need for robust institutions, transparent data systems, and long-term political commitment. As climate variability and urban demand reshape water needs, the lessons from NWMP and WRCP remain relevant for sustainable and inclusive water management in India and beyond.

Keywords: Integrated Water Resources Management (IWRM), National Water Management Project (NWMP), Water Resources Consolidation Project (WRCP), Tamil Nadu Irrigation Reforms.

1 INTRODUCTION

Beginning in the mid-1980s, India launched the National Water Management Project (NWMP) to modernize large and medium irrigation schemes and foster institutional reforms across several states, including Karnataka, Maharashtra, Orissa, Uttar Pradesh, and Tamil Nadu. This initiative, supported by the World Bank, emphasized rehabilitating canals, headworks, and distributaries while piloting participatory irrigation management. Tamil Nadu built on these foundations by launching the Water Resources Consolidation Project (WRCP) in 1995, designed to integrate basin planning, tank system rehabilitation, groundwater regulation, and broader institutional innovation. By 2010, both programs had influenced Tamil Nadu's irrigation landscape, though with varied success. This paper examines their physical, institutional, environmental, and social impacts up to 2010, highlighting lessons for future water governance.

2 EVOLUTION OF NWMP (1986–1994)

India's NWMP was introduced in 1986–87 through the Ministry of Water Resources, financed in part by the World Bank. It aimed to upgrade irrigation systems and encourage farmer participation through proportional flow and institutional reforms (World Bank, 1994). The early years saw considerable achievements in infrastructure rehabilitation within target schemes. For instance, Tamil Nadu's Sathanur project and Karnataka's Bhadra system demonstrated enhanced water availability and improved cropping intensity (Sakthivadivel et al., 1995). The Sathanur Farmers' Association reported an additional 6,000 acres under reliable irrigation following modernization interventions.

Despite these strides, NWMP's progress in reforming institutional frameworks was limited. Routine monitoring mechanisms remained underdeveloped, proportional flow controls were inconsistently implemented, and cost-recovery regimes lagged. Farmers remained peripheral to decision-making, diluting the impact of participatory goals. An in-depth evaluation by the International Irrigation Management Institute confirmed that improvements in yield or equity could not be directly traced to NWMP reforms (Sakthivadivel et al., 1995). Problems with operation and maintenance (O&M) funding, driven by high overhead and scarcity of water charges reform, became prominent.

Nevertheless, NWMP established a foundation for future reforms. In 1994, its successor, NWMP-II, carried forward the modernization agenda, spanning over 5 million ha, emphasizing O&M financing and institutional engagement. In Tamil Nadu, this momentum shaped the birth of WRCP, which aimed for more integrated and sustained reforms.

3 LAUNCH OF WRCP IN TAMIL NADU

Officially initiated in 1995 with World Bank co-funding, the Water Resources Consolidation Project was ambitious in design. It set out to rehabilitate irrigation infrastructure across approximately 20 districts—covering main canals, field channels, and over 600 non-system tanks—and introduce systems to bolster basin planning, environmental safeguards, groundwater regulation, and farmer participation (Government of Tamil Nadu & World Bank, 1998). WRCP's multi-pronged approach included:

1. Structural modernization of canals, tanks, and headworks under the System Improvement and Farmer Turnover (SIFT) model.
2. Institution-building—creating the Water Resources Organisation (WRO), establishing River Basin Boards (a South Asian first), and enacting the Tamil Nadu Groundwater (Development & Management) Act (2003).

3. Water planning—sub-basin and basin-level assessment, driven by remote sensing, groundwater censuses, and a Water Resources Research Fund (WRRF).
4. Environmental integration—ensuring sustainability in civil works and resource use.
5. Farmer outreach—supporting Water User Associations (WUAs) for localized O&M and governance.

A mid-term review in 1998 extended WRCP's purview to include agricultural intensification and tank-safety measures.

4 INSTITUTIONAL REFORMS AND LEGAL FRAMEWORK

By the early 2000s, WRCP had instituted several institutional reforms. The WRO was established to oversee integrated planning and management. WRO's reorganization reallocated tasks traditionally under the Public Works Department to dedicated entities focusing solely on water. River Basin Boards were established for zones like Palar and Thamirabarani, pioneering basin-centric governance (Wood, 2010). These boards promoted stakeholder participation and evidence-driven planning, aiming to decouple irrigation delivery from water resource oversight.

In 2003, Tamil Nadu passed its groundwater law—the country's first comprehensive legislation emphasizing regulation, licensing, and sustainable withdrawal. This was a milestone in balancing resource use and development priorities (Wood, 2010). Remote sensing-supported well censuses, conducted under WRCP, offered statewide data on groundwater yields—a significant step toward transparency.

The state government also adopted cost-recovery mandates for irrigation and agricultural electricity use. Though these policies laid a strategic groundwork, implementation lagged, largely due to political and social resistance (IAMWARM, 2007).

5 INFRASTRUCTURE REHABILITATION AND FARMER ENGAGEMENT

WRCP's infrastructure interventions were substantial. More than 600 minor tanks were restored or rehabilitated, enhancing storage capacity and groundwater recharge. Major canal modernization efforts close to system reaches improved conveyance efficiency. The SIFT mechanism allocated system control to WUAs after technical renewal—a critical attempt to engage farmers in operational decisions.

Evidence indicates that these efforts led to improved cropping intensity, especially in tank-irrigated districts. For example, watershed and tank rehabilitation in regions like Bhavani contributed to extended water availability—from 3–6 months to 9–12 months annually—with yields rising between 3% and 29% in irrigated crops (Manivannan et al., 2007). However, WUA effectiveness varied across regions; formal structures did not always translate into grassroots efficacy. Tail-end areas remained disadvantaged, and collective O&M and cost-recovery trust levels fluctuated.

6 ENVIRONMENTAL AND RESEARCH INNOVATIONS

WRCP emphasized environmental planning within its design. Funding was allocated for basin-wide assessments that included environmental flows and ecological sustainability. Remote sensing applications facilitated

a sub-basin inventory of groundwater levels, land use, and tank conditions, creating a rich database for management. Dam safety measures and environmental safeguards during civil works gained prominence.

A Water Resources Research Fund (WRRF) was instituted to support academic studies, strategic pilots, and knowledge dissemination. The Tamil Nadu IAMWARM project (2007–2010), which built on WRCP, expanded innovations like drip irrigation, crop diversification, and precision tools within small basins—indicating institutional learning and procedural evolution (IAMWARM, 2007).

7 EVALUATION AND OUTCOMES BY PROJECT CLOSURE (2004)

By its formal closure in 2004, WRCP had met or exceeded infrastructure goals and operational plans under the development framework. The World Bank rated it "satisfactory" in terms of achievement (World Bank, 2009).

Key accomplishments included:

- Rehabilitation of hundreds of tanks and modernization of canals.
- Institutionalization of WRO, basin boards, and groundwater law.
- Structured environmental screening and planning processes.
- Emergence of WUAs in many localities.

Yet, limitations persisted. Farmer involvement, while formally emphasized, was inconsistent and sometimes superficial. Cost recovery and agricultural electricity tariffs saw limited reform. Inter-departmental coordination—especially among irrigation, agriculture, environment, and local governance—remained weak, undermining integrated planning.

8 POST-WRCP DEVELOPMENTS (2004–2010)

In the subsequent years leading to 2010, Tamil Nadu deepened certain interventions and responded to urban stressors.

The Minjur desalination plant, India's largest, began operations in July 2010, supplying approximately 100 MLD to help Chennai tackle urban water scarcity (Wikipedia, 2010). While WRCP did not directly oversee urban supply, its institutional framework influenced inter-sector integration.

The Tamil Nadu Irrigated Agriculture Modernization and Water-Bodies Restoration and Management (IAMWARM) project (2007–2010) built directly on WRCP foundations. It promoted crop diversification, precision agriculture, decentralized governance, and climate resilience within basin-level frameworks (IAMWARM, 2007).

Groundwater data collection and legislative reforms continued, although enforcement remained weak. WUAs, institutionalized in WRCP, expanded during IAMWARM, supporting crop extension and O&M in many areas—although equitable access for tail-end farmers remained incomplete.

9 COMPARATIVE INSIGHTS: NWMP VS. WRCP

Table 1: Comparison of NWMP and WRCP

Dimension	NWMP (by 1994)	WRCP (1995–2010)
Scope	Canal modernization across states	State-wide rehabilitation of canals, tanks, ground- and surface-water systems
Institutional design	Centralized, peripheral farmer involvement	Basin boards, WRO, WUAs, groundwater law
Monitoring & data	Weak M&E systems	Remote sensing, groundwater census, WRRF
Farmer engagement	Limited	Active WUA cultivation, though uneven
Sustainability	Infrastructure without performance funding	Institutional framework secured, funding challenges remain

NWMP's limitations in linking infrastructure to sustainable farmer-led governance were significant. In contrast, WRCP's path-breaking institutional models delivered visible reforms through mechanisms that endured into IAMWARM—though systemic gaps persisted.

10 SYNTHESIS: STRENGTHS AND WEAKNESSES OF WRCP BY 2010

Strengths

1. Institutional innovation through WRO and basin planning.
2. Legislative breakthrough with the groundwater act.
3. Mass-major tank restoration.
4. Inclusion of environmental safeguards and data systems.
5. Examination of farmer-centered governance via WUAs and pilots.

Weaknesses

1. Enforcement gaps, particularly in cost recovery and groundwater regulation.
2. Farmer participation varied greatly, with tail-end neglect.
3. Coordination across government silos was weak.
4. Urban demand began to compete without integrated planning capacity.
5. O&M funding remained uncertain without strong farmer contributions.

11 LESSONS AND POLICY IMPLICATIONS

The experience of NWMP and WRCP up to 2010 offers enduring insights:

- Infrastructure investments, while necessary, must be paired with robust performance funding and long-term governance models.
- Institutional transformation must be systemic—from legal design to incentivized farmer bodies.
- Data-driven planning using remote sensing and groundwater census validates evidence-based decision-making.
- Environmental integration ensures sustainability and resilience.
- Inter-sector coordination among irrigation, agriculture, urban planning, and governance can avoid water conflicts.

Future reforms should invest in basin-level regulatory agencies, decentralization, cost recovery, and climate adaptation to respond to emerging demands.

12 CONCLUSION

From NWMP's early infrastructural ambitions to WRCP's more integrated transformation, India, and particularly Tamil Nadu, demonstrated evolution in water governance. NWMP's achievements in canal modernization were limited by institutional inertia. In contrast, WRCP advanced a more holistic approach—rehabilitating tanks, enabling participatory governance, enacting groundwater law, and adopting basin planning. By 2010, urban water pressures and climate variability highlighted the ongoing need for reform.

However, Tamil Nadu's model, as implemented through WRCP and IAMWARM, illustrates the potential of combining infrastructure, legislation, community involvement, and data systems within a basin governance paradigm. It underlines that sustainable water management depends on cohesive institutions, long-term funding, and adaptability in the face of change.

In sum, the Vagaikulam experience and the broader Tamil Nadu reforms demonstrate that participatory and institutionally grounded irrigation management, when properly resourced and socially inclusive, can significantly enhance water use efficiency, agricultural livelihoods, and local governance. Its lessons are vital not only for reviving traditional tank systems but also for shaping future water management strategies in an era of climate stress, rural transformation, and resource scarcity.

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