

## Linkage Mechanisms Between Different Institutional Nodes of Irrigation Management in Orissa

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### ABSTRACT

The intra and inter institutional linkages in the context of irrigation institutions in the state of Orissa are assessed through actor linkage map and matrix, conflict matrix and importance / influence matrix. Spatial structure of irrigation administration is based on administrative boundaries and projects rather than on any well-defined hydro-geological boundaries. The innovation of Pani Panchayat institution has diverted larger flow of information from other institutional nodes towards it. There is multiplicity of functions of each institutional node as well as multiplicity of institutional nodes for certain function causing conflicts as well as complementarities. The constraints and opportunities for establishing linkage mechanism are delineated providing feedback for strengthening the water institutions to ensure efficiency of the irrigation system.

**Key words :** Irrigation administration; Institutional interface; Structural linkage; Opportunities and constraints of linkage;

A paradigm shift in irrigation sector from supply management to demand management has been seen as a fundamental transformation in the management of water resources (*Food and Agriculture Organisation of the United Nations, 2003*). Over the last decades the policy agenda of water sector in India has been focused on stakeholders' participation to address the problems related to operation and maintenance of irrigation systems and low irrigation efficiency (*Tanwar, 1998; Parthasarathy, 2000*). It has been recognized that institutional innovations are not only central to the development of more efficient research and extension systems but also such developments underpin the wider process of technical and economic change (*Hall et al, 2000*). Institutional innovations have mostly been initiated by the private sector; however, donor driven institutional initiatives cannot sustain long (*Saleth, 1999; Selvarajan, 2001*). Institutional innovations have a vital role to play in reforming public sectors of irrigation management, developing linkage and partnership with the related water sector organizations. Analysis of linkage mechanisms between various institutional nodes can assist to be aware of institutional issues, which could hinder or help research and development initiatives (*Matsaert, 2002*). Hence, present study was carried out to explore the irrigation administration structure and linkage mechanisms in the state of Orissa, India.

### METHODOLOGY

Irrigation administration structure is studied on the

basis of literature review, secondary data collection and group discussions. Stakeholder analysis was conducted to map institutional nodes/actors (organizations) dealing with irrigation management in Orissa. It was used to learn about organogram, mandate, capacity and performance of the different organizations from macro to micro level. Having identified the key stakeholders as well as nodes / actors of irrigation management the following conceptual frameworks were used to analyse and map linkages, key strength, weakness, areas of potential conflict, etc.

*Conflict/Complementarity matrix :* It has elicited areas of co-operation and conflict between key stakeholders.

*Actor linkage map and matrix :* These have explored linkages and flows of information between different irrigation institutional nodes. It is used to gain an understanding of the key institutional linkages, identifying strengths and opportunities in a given institutional environment and in developing meaningful strategy and links for future change.

*Importance/Influence matrix :* It has indicated the relative importance and influence of irrigation institutional nodes.

### RESULTS AND DISCUSSION

*Irrigation administration structure and relative role :* Water Resources Board, the apex body in water sector with Chief Secretary of the State as Chairman constituted on 1993, is the highest forum to ensure interdepartmental co-ordination and is involved in water planning and

development processes such as formulation of State water policy, integrated planning of water resources, allocation of water resources to various water use sectors, prioritization of water resources development, environment management plan, etc. Spatial structure of water administration is based on administrative boundaries and projects rather than on any well-defined hydro-geological boundaries.

All the following organisations involved in development of water resources in Orissa were brought under Water Resources Department during 1994 onwards. It has been the lead agency for water resources development in the state, responsible for planning, developing and managing the states water resources for irrigation, bulk water supply, drainage and flood control, with direct responsibility for implementation of major, medium and minor irrigation projects, and their operation and maintenance as well as ground water exploitation.

- \* *Water resources (major & medium)* - responsible for implementation, monitoring, operation and maintenance of major and medium irrigation projects.
- \* *Minor irrigation* - responsible for implementation, monitoring, operation and maintenance of minor irrigation projects.
- \* *Command area development authority (CADA)* - responsible for multi-disciplinary activities of irrigated agriculture in the selected command areas, below the outlet.
- \* *Orissa lift irrigation corporation (OLIC)* - responsible for implementation, monitoring, operation and maintenance of lift irrigation projects.
- \* *Directorate of ground water survey & investigation (GWSI)* - vested with the responsibility of survey, investigation and monitoring of ground water resource of the State and also provides technical guidance on exploration of ground water resource to the user agencies and individuals, keeping in view of its long term sustainability.
- \* *Orissa construction corporation (OCC)* - carries out major works like tunneling, barrages and manufacture of gates as a public sector agency.
- \* *Water and land management institute (WALMI)* - provides irrigation sector training to officers and staff of irrigation department.
- \* *Pani panchayat* - assumes full responsibility for operation and maintenance of the minor/sub-minor

and all structures turned over to it. It ensures construction/maintenance and repair of all the watercourses, field channels, field drainage, water distribution, crop planning, collection of water rates, etc. in the area under its jurisdiction. Water Users Association maintains its own fund to meet the operation and maintenance expenditure.

Conforming to the policy guidelines of National Water Policy (1987) and State Water Policy of Orissa (1994), the government of Orissa with a view to providing equitable, timely and assured irrigation has introduced the concept of Pani Panchayat under participatory irrigation management (PIM) programme. The concepts finally lead to transfer of tertiary irrigation networks (Minor/Sub-minors) to registered Pani Panchayats. The responsibility of O&M of the reservoir/diversion weir, dam, spillways, sluices, primary and secondary distribution networks etc. rests with the Department of Water Resources, where as the responsibility of O&M of the tertiary systems i.e. (below minor/sub-minor) is with Pani Panchayat. This programme envisages making farmers to participate in the water resources planning and management and to hand over the system to the farmers for which suitable legislation has already been done. The Orissa Pani Panchayat Act-2002 and Orissa Pani Panchayat Rules-2003 are concrete steps in this direction.

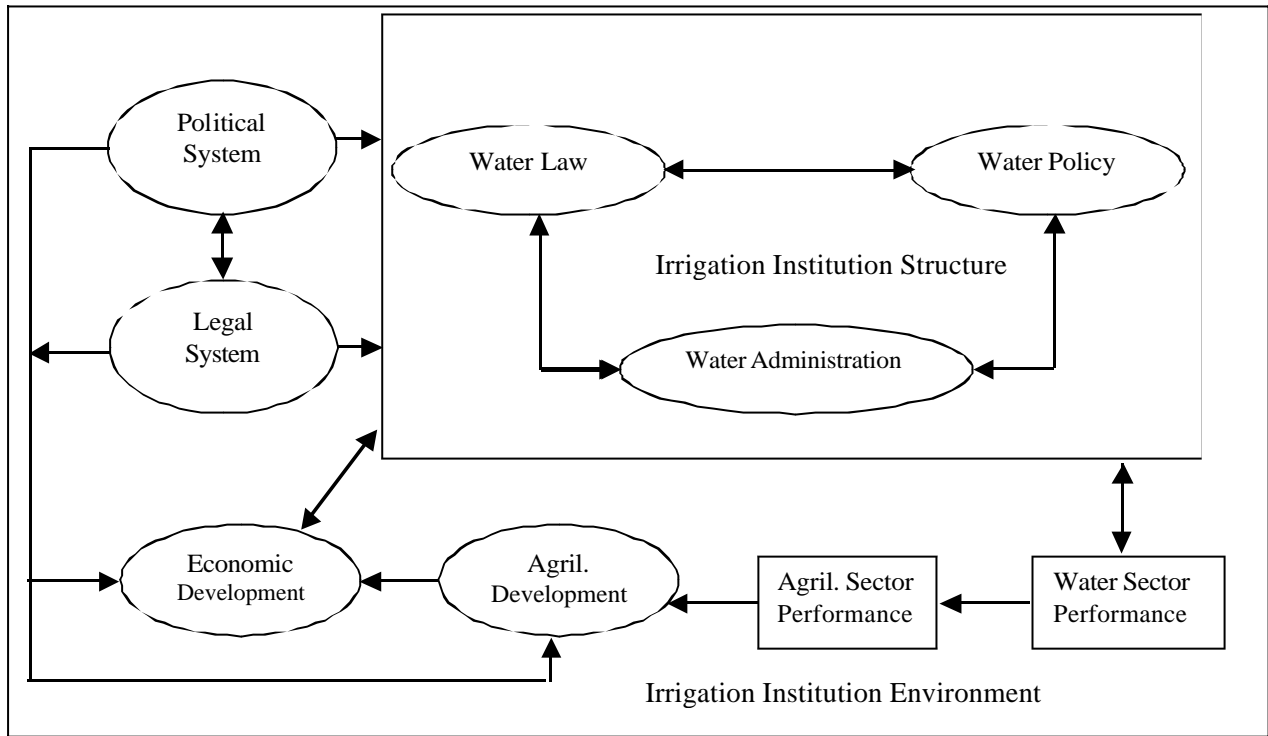
*Linkage mechanisms* : The linkage mechanisms between different institutional nodes of irrigation water management are assessed identifying the opportunities for and constraints to institutional linkages. There are two dimensions to institutional linkages: linkages of institutions with the physical, social and political economic aspects (i.e. the institutional interface with the physical, socio-economic-political environment) and linkages within institutional components (i.e. the structural linkages within and among the institutions). The first dimension relates to the institutional replicability and the second determines institutional effectiveness.

*Institutional interface with the physical, socio-economic-political environment* : As such, three institutional components in water institution structure are themselves nested and linked both organically and operationally (Fig. 1). Institutional linkage function as a vehicle for conveying changes across institutional components/aspects (Saleth, 2004).

To understand this link the concept of PIM / irrigation management transfer (IMT) can be considered. IMT/ PIM is an organizational change from state management

to farmers' management of irrigation system, which has a favourable effect on policy dimensions such as water pricing and cost recovery. This kind of organizational change can also pave the way for technical and

institutional changes like introduction of volumetric distribution procedure and the establishment of water right system. Organizational changes can be much more effective if it is coupled and corresponding changes in



**Fig. 1.** Institutional components and linkages

the legal and technical dimensions. Institutional linkages play a key role in determining both the individual and joint performance of water and agricultural institutional sector which influences economic development.

As the competition for fresh water is increasing, water allocation among different sectors and users is an important issue. Table 1 summarizes the competitions and conflicts over fresh water. Landowners use maximum

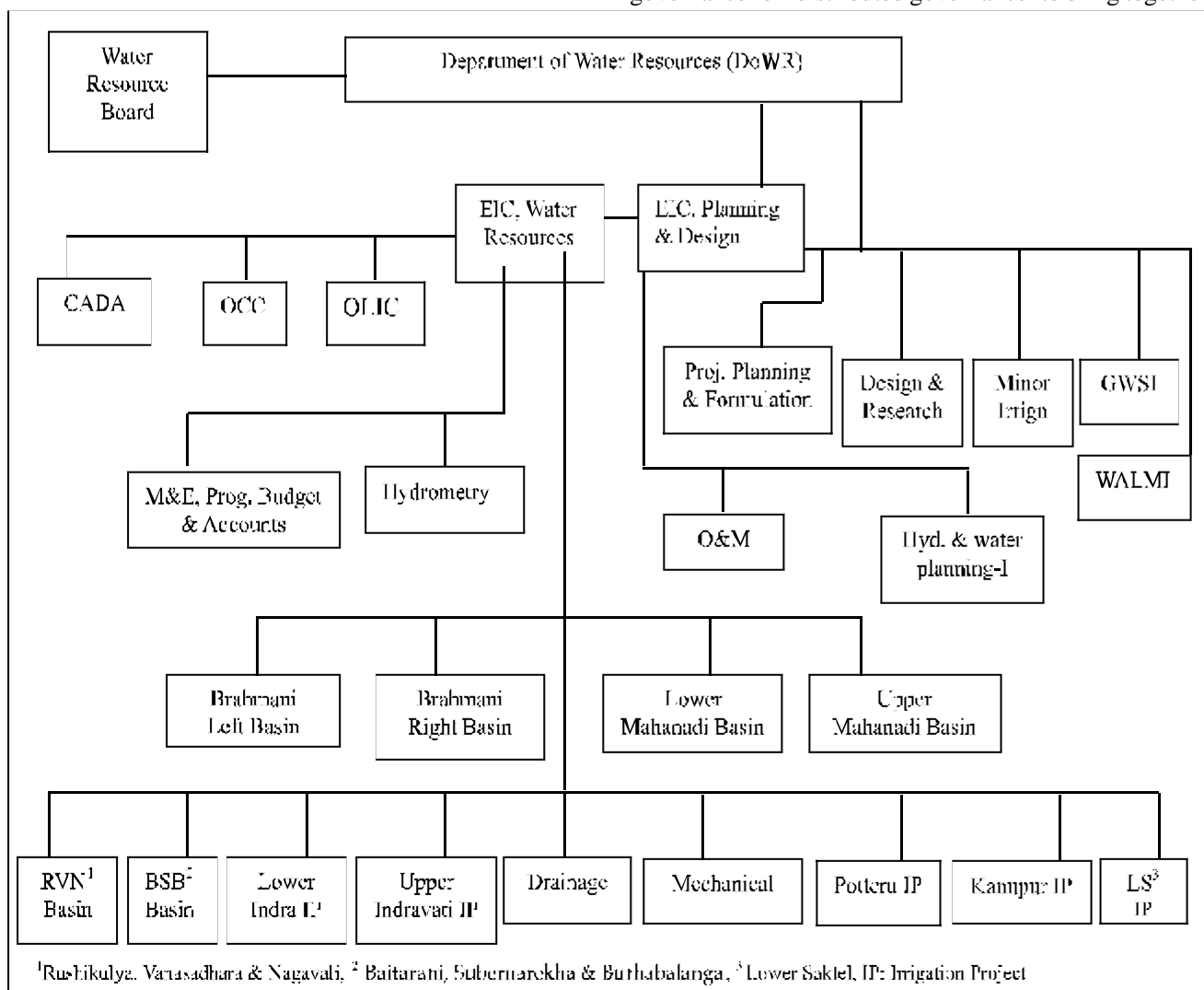
**Table 1.** Competition and conflicts over fresh water

Different categories of stakeholders of water	Rural domestic users	Urban domestic users	Land owners / farmers	Industrialists	Water managers
Importance of water	Basic necessity	Basic necessity	Agricultural production and employment	Growth of economy	Public good
Users' main attributes	Dispersed and highly stratified	Concentrated and homogeneous	Farmers' group but segregated between large, medium, small and marginal	Influential having large clout over central and state govt. agencies	Cadre based organisation
Goals and interests	Access to safe drinking water	Access to safe drinking water	Reliable and adequate supply of irrigation water for agriculture	Reliable, cheap and sufficient water for industrial production and facilities	Efficient and reliable supply of water, conservation of water bodies and Operation and maintenance of irrigation system
Conflict of interests with other stakeholders	With land owners/ farmers, urban users and water industrialists	Farmers and rural domestic users	Industrialists, urban domestic users	Rural people, urban domestic users	Farmers and users
Satisfaction	Not always	Poor urban slum dwellers suffer	Small and marginal farmers and tail end farmers in irrigation command suffer.	Secured water supply and able to bypass pollution laws	Yes

amount about 93% of total fresh water; however, they are not a homogeneous group and can be differentiated in terms of size of holding. Industrialists are the smallest group but have strong influence over the government's policies. The rural domestic water users by far the largest in number; but they are dispersed, stratified and the weakest among all the claimants of fresh water resources. Although less water is required for domestic purpose, often collecting it needs walking a few miles. National water policy and State water policy has given the primacy to drinking water followed by irrigation water. As the situation of fresh water resources is further tightened and the gap between supply and requirements

widens, the competition and conflict over water would increase. The looser are poor farmers and people living in remote rural areas who are unable to meet their basic needs. Under these circumstances the institutional interface should be able to provide safe water for domestic users as well as to meet the needs for irrigation water to enhance agricultural production.

*Structural linkages among institutional nodes at different levels :* The structural linkages within and among the institutions are very critical dimensions of institutional embeddedness. The linkages that receive attention are essentially in terms of the need for 'polycentric governance' or 'distributed governance' to bring together



**Fig 2.** Actor Linkage Map showing Structural Linkage Mechanisms of DoWR, Orissa.

various stakeholders within a common institutional framework. The intra and inter institutional linkages in the context of water institutions in the state of Orissa are

presented through Fig. 2.

Actor linkage matrix is used to map flow of information between key stakeholders of irrigation water

resources in the state of Orissa (Table 2). This matrix identifies all actors and shows the links between major actor and other actors in an innovation system. The cells in the matrix represent flows of information from the actors in the rows to actors in the columns. It is evident from the above-mentioned actor linkage map as well as actor linkage matrix that major and medium irrigation is the largest sector in the water institution structure of the state of Orissa followed by minor irrigation. Incase of

water institutional arrangement in Orissa, the formal/macro level institutions are related mostly to canal based surface irrigation systems, where as most of the informal micro level institutions are mainly associated with ground water and tank irrigation systems. The innovation of Pani Panchayat (PP) institution has diverted larger flow of information as well as initiative from major and medium irrigation, minor irrigation, CADA, OLIC and WALMI towards it.

Table 2. Actor linkage matrix shows flow of information between key stakeholders of irrigation water resources in the state of Orissa.

	Major & medium irrigation	Minor irrigation	CADA	CWC	GWSI	OLIC	CGWB	WALMI	OCC	PP
Major & medium irrigation			----	----				----	----	----
Minor irrigation				----				----		----
CADA	----			----						----
CWC	----	----	----							
GWSI										
OLIC					----	----		----		----
CGWB					----					
WALMI	----	----				----				----
OCC	----									
Pani panchayat	----	----	----			----		----		

It is revealing that there is multiplicity of functions of each institutional nodes as well as multiplicity of institutional nodes for certain functions (Table 3). Most of the functionaries of institutional nodes are confined at

state level and reducing towards grass-root level. Majority of the actors are playing multiple roles and engaged in extension and training activities followed by monitoring & evaluation activities.

Table 3. Importance/Influence matrix showing institutional nodes/actors having influence/importance on specific function

Functions	Major & medium irrigation	Minor irrigation	CADA	GWSI	OLIC	WALMI	OCC	PP	CWC	GWB
Water resources development	----	----	----		----		----		----	
Operation and maintenance	----	----	----		----			----		
Monitoring and Research	----	----	----	----	----	----			----	----
Extension/Training			----			----				

Linkage between the actors dealing with surface water is evident as it is in case of and ground water. However, for conjunctive use of both surface and ground water linkage between the actors of both sectors is important that seems to be missing. The typologies of existing linkages are largely restricted to structural and normative

linkage rather than formative linkage. The formative linkage across the actors is a necessity for judicious management of water resources as a whole in the state. The vertical linkage mechanism is more prominent as compared to horizontal linkage at present. It is evident if we look at the levels of functioning and maintaining

linkages in different institutional nodes of water management in Orissa.

*Opportunities to and constraints for institutional linkages :* The functioning of irrigation sector is controlled by three institutional regimes. First is the administrative mechanism in the sector. The second institutional regime pertains to the formal village-level institutions. The third institutional regime refers to the WUAs / Pani Panchayats. The lack of horizontal integration and linkage between different levels makes it difficult to ensure efficiency of the irrigation system. WUAs are formed through the synthesis of physical, technical, social and economic parameters. Policy and agency inducing such formations support these parameters, but all these act at different levels. Initially, the technical and physical parameters decide the formation. This is supported and reinforced by the other four components. In addition, the formation of an institution is decided mainly by the homogeneity of the community involved. The WUAs have strong link with the performance of the irrigation system and the condition of the resource, which, in turn, decide the sustainability of WUAs.

Irrigation management through the community participation requires fuller understanding of the social

engineering in that particular region. Imposition of organizational structure may have occurred in the enthusiasm to transfer the irrigation management to the stakeholders. As it is evident from the number of Pani Panchayats formed in Orissa during the years since the inception of PIM in the state during 1996. PIM in India has followed two approaches –legislative & motivational. Andhra Pradesh and Madhya Pradesh first enacted legislation and opted for fast and extensive introduction of PIM, i.e. going in for a top down approach. While Maharashtra and Gujarat adopted motivational strategy, followed by legislation, i.e. a bottom-up approach. Orissa adopted in between approach – for certain period, bottom-up approach, i.e., motivational strategy; when attained certain level of momentum, adopted a top down strategy, i.e., legislation. By 1997 it was feasible to form only 50 WUAs and by 2000 another 113 WUAs were formed with addition of 10 projects. However, by 2005-06 under major and medium irrigation projects another 914 WUAs were formed. If there is an imposition of sets of rules and organizational structure on the understanding of few selected experiences, it will face difficulty in enforcement mechanism. Due to this fact Pani Panchayats in Orissa has been sporadically successful.

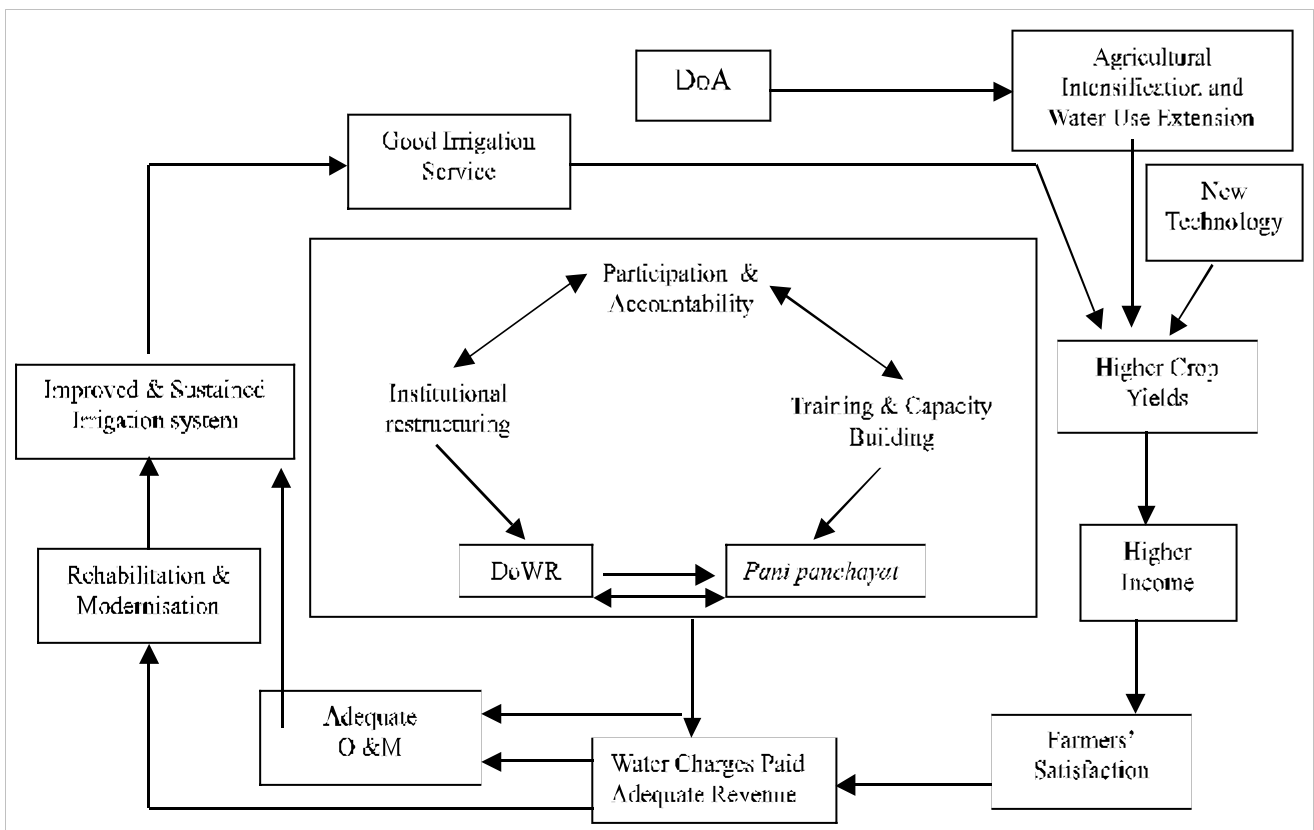


Fig. 3. Virtuous circle of Orissa's irrigation and agricultural sector

One aspect of intra and inter institutional linkages is 'institutional thickening'. There are evidences to show that multiple institutions (institutional thickness) are more effective than a single or few institutions. But, under conditions, where many institutions are loosely linked or intensely competing for the same space (e.g. Panchayats, WUAs/Pani panchayats, Watershed committees, and various other committees), multiple institutions are no guarantee for institutional effectiveness. Water resources governance and management is in need of adequate institutional framework and linkages at meso level, as this is where the problems of multi-functionality and interest group interaction / negotiation seem to play out most strongly. The government of Orissa has initiated a major shift in its approach through Pani Panchayat as most appropriate institution for efficient water management and agricultural development. This reform process through an effective institutional linkage

mechanism will pave the way for creating virtuous circle in Orissa's irrigation and agricultural sector (Fig. 3).

## CONCLUSION

Present study identifies key partners and networks for research, development and extension activities related to irrigation management. Linkage between the actors dealing with surface water is evident as it is in case of ground water. However, for conjunctive use of both surface and ground water, linkage between the actors of both sectors is important that seems to be missing. The typologies of existing linkages are largely restricted to structural and normative linkage rather than formative linkage. The vertical linkage mechanism is more prominent as compared to horizontal linkage at present institutional arrangements. The formative and horizontal linkages across the actors are a necessity for judicious management of irrigation in the state.

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