UTTAR PRADESH WATER SECTOR RESTRUCTURING PROJECT

Proposed for World Bank financing by

GOVERNMENT OF UTTAR PRADESH

ENVIRONMENTAL ASSESSMENT

EXECUTIVE SUMMARY

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Introduction

Rural livelihoods in South Asia are inextricably linked to sustainable natural resources management. A key concern in this regard is sustainable water resources planning and management of diminishing and increasingly polluted supplies and increasing demands from multiple sectors. At the multi-sectoral level, issues of integrated and rational water resources planning and management in terms of integrated river basin management, environmentally and socially sustainable river basin planning, inter-sectoral water allocation and water rights, stakeholder participation, improved and shared basin knowledge base, enhanced information-based decision-making, trans-boundary dispute resolution and rationalization of water charges have often been the subject of many papers and deliberations. However, there have been few examples of any of these being undertaken in true spirit in practice in the region, as in much of the developing world. The situation is similar in the region’s most important water using sector – irrigated agriculture – where often-discussed but little-resolved issues include those of reforming and modernizing usually bloated, bankrupt, inefficient, and inflexible sector institutions, putting farmer clients first, integrating and modernizing irrigation & drainage and agriculture & irrigation activities, participatory irrigation management, private sector involvement, land tenure reform, mainstreaming environmental and social objectives and safeguards into irrigation systems management, and rational and volumetric water pricing.

Past experiences of Governments in the region to change the status quo, through their own and donor-financed programs has had mixed results. There are few good examples of truly main-streamed reform, and in general, there have been scattered and insulated investments with little mainstreaming of experiences into Government institutions, little political, bureaucratic and technical commitment to take the bold measures necessary to drag these institutions into a modern world with redefined roles and responsibilities. Environmental issues are one of several issues that need urgent attention. All over India, and in large states such as Uttar Pradesh, these problems are systemic and a radical paradigm shift is required to help resolve them.

The proposed Uttar Pradesh Water Sector Restructuring Project (UPWSRP) seeks to help develop such a paradigm shift in Uttar Pradesh at two levels – one for integrated water resources planning and management in a basin context and another for improving the institutional and physical arrangements for irrigated agriculture. The project places itself firmly in a long-term programmatic framework, and learning from past lessons, focuses on institutional reform with pilot investments to generate lessons to help create the enabling environment for the implementation of an ambitious program.

It is expected that environmental objectives and mitigation measures for environmental concerns will be fully mainstreamed into all aspects of the design and implementation of the project and program. This summary describes the Environmental Assessment that has been prepared for the proposed project and attempts to put the project EA in a strategic program framework. The emphasis is on introducing and analyzing, from an environmental viewpoint, the project and the programmatic framework; summarizing potential environmental benefits and concerns associated with the project; analyzing alternatives; and finally presenting the summary of the Environmental Management Plan (EMP) recommendations to be mainstreamed into the project.
Policy and Institutional Framework

The 1987 National Water Policy of the GOI emphasises the need for integrated water resources management in a basin context. Uttar Pradesh has recently (in Dec 1999) promulgated a progressive State Water Policy that seeks to initiate much-needed radical reforms in the way the water resources of the state are managed and the proposed program and project seeks to initiate the implementation of this policy in the selected areas. The Policy is also important from an environmental and social viewpoint and includes references to:

- Adequate provision for ecological, navigational, recreational and other purposes;
- Key concern about the quality of water, its protection against pollution and safeguards against water-related health hazards;
- Focus on basic drinking water and sanitation needs;
- Consideration of integrated river basin planning as a unit of development;
- Focus on data, information and knowledge-base development for decision-making;
- A special focus on resettlement and rehabilitation of affected persons; and,
- Participatory Irrigation Management.

The GOI and the State also have a significant environmental regulatory framework for assessment of project environmental impacts. However, there is a need to strengthen this environmental policy and regulatory framework with respect to the irrigated agriculture sector.

Uttar Pradesh, with a population of about 160 million people (even after the new state of Uttaranchal was split off), has an economy that is dominated by agriculture (40% of the State Domestic Product and 75% of employment). The State leads India in the number of people below poverty line (42%, of whom 80% are in agriculture-related activities. The overall State economy is sluggish and the UP Irrigation Department, that once made a net contribution to the treasury, is now running deficits of about Rs. 1500 crore annually (about US $ 320 m). Appropriate water management coupled with other agricultural inputs could result in improved yields, increased intensity of cultivation and improved marketing and associated off-farm employment which can have enormous impact in reducing poverty, increasing incomes and enhancing food security. This, along with substantial reform in irrigation sector institutions would contribute to an overall improvement in the state's economy.

On the institutional front, there is a conspicuous absence of inter-sectoral apex institutions that can help promote integrated water resources management. A result is usually ad-hoc resolution of issues by crisis management instead of systematic planning and institutionalization of decision-making on water resource in a basin context. There is also an absence of developing country role models for river basin institutions that have the mandate and capacity for integrated land and water management within a hydrologic unit.

The primary sector institution for irrigated agriculture is the Uttar Pradesh Irrigation Department (UPID). The UPID is the oldest continuously functioning sectoral department in India. The UPID had a rather impressive past in terms of planning, constructing and operating some very complex and spectacular engineering works. The current situation is very different and the symptoms include a lack of capacity to adapt to modern times and ways and means of managing irrigation systems, very low morale due to extremely poor human resources development opportunities (including hiring and firing policies, official incentive structures, career development, training, etc), a change in focus from maximizing agricultural productivity to delivering water, low level of participation of their clients in decision making, rampant corruption and especially a rapidly increasing financial loss. The UPID has little experience in addressing social issues, including on partnerships in managing the systems with farmers and farmer organizations. UP has practically no experience in water user associations for operations and
maintenance of the irrigation and drainage systems. There is currently no R&R policy for the sector in UP (although one is being developed as part of preparation for this project). On the environmental front, there is little in-house capacity or awareness in UPID to mainstream ecological, pollution or other natural resources management issues in its activities. There is a need to augment staff and training opportunities on environmental management, access to expertise and other capacity building in order to develop spatial resource management perspectives in a basin framework, developing guidelines for mainstreaming environmental and social objectives and concerns in UPID activities and interact with other related agencies and stakeholders.

The flagship agency of the Department of Environment (DOE) in UP is the State Pollution Control Board (PCB), which is currently primarily concerned with industrial pollution abatement and even there the capacity is very limited. There is another WB financed activity on the development of an Environmental Management Framework for UP as part of the overall economic, fiscal and governance reforms program package. The involvement of the DOE in UPID activities is minimal at present.

The other key related institutions are the UP Diversified Agricultural Support Project that seeks to promote agricultural intensification, diversification, sustainable cropping techniques, and improvement of market access. The UP Bhoomi Sudhar Nigam is also an impressive institution that has been established to reclaim saline-sodic soils of ten districts in Eastern UP under two World Bank projects called the Sodic Lands Reclamation Project – I & II. The UPSLRP also attempted to rehabilitate and modernize two minors and to pilot participatory irrigation management models.

Overall, there is a complex web of institutions involved in various aspects of irrigated agriculture management. These include the Water and Land Management Institute (WALMI) that provides training and support on participatory irrigation management, the UP State Remote Sensing Applications Center that has developed competence in satellite imagery analysis, environmental monitoring, etc.

The World Bank has recently chosen UP to be one of their “focus states”, and is pursuing a multi-sectoral approach to lending, in which the water sector and irrigated agriculture sub-sectors are key to address rural poverty, fiscal and governance issues. The proposed project and program should help implement the State Water Policy in the selected basin and strengthen and network the institutional framework for irrigated agriculture.

**Project Description**

**Regional Setting:** The state of UP is home to many significant river systems that are part of the Ganges Basin. Based on various poverty indicators, the Ghagra-Gomti basin (figure S1) in eastern UP has been selected to initiate a water and irrigation reform program. The basin comprises a significant portion of UP and consists mainly of the Sarda (Mahakali in Nepal), Ghagra, Gomti and Rapti rivers. There are many issues that are related to sustainable water resource management in this basin, including those of large-scale salinisation and waterlogging, low agricultural productivity, drinking water coverage, conflicts over inter-sectoral water allocation and use, wetland management and water quality problems in surface and ground waters. The irrigation systems include the Sarada, Sarada-Sahayak and the Sarayu systems that are fed by the Sarda and Ghaghra rivers and consist of branches, distributaries, minors and outlets that lead to watercourses.
Development Objectives: The development objectives of the proposed Uttar Pradesh Water Sector Reform Program (figure S2) are:

(i) to increase productivity of water
(ii) to increase and sustain agricultural productivity, and
(iii) to improve the living standards of the rural poor

Project Details: These objectives would be achieved by a series of overlapping investments. The first project in this series, UPWSRP[-I], would help create the enabling environment for achieving these objectives by:

(i) establishing the new institutions required to carry forward the water sector reform process
(ii) adopting a riverbasin approach to identifying issues and constraints to development in the sector starting with the Ghagra-Gomti Basin and formulating a comprehensive environmentally-sustainable development strategy
(iii) rightsizing and capacity-building to modernize functioning of irrigation and drainage sub-sector institutions
(iv) piloting replicable management options for sustained irrigation and drainage operations (including agricultural intensification and diversification) by both public and private sector entities
(v) piloting replicable management options for sub-basin planning and management
(vi) continue preparation of next investment in the program

The proposed project envisages institutional restructuring and reform at the apex level to encourage integrated water management in the State and at the level of the UP Irrigation Department. In addition, the project proposes to pilot reforms on the ground in selected sub-basins (the Jaunpur Branch Sub-basin [JBS] and the Imamganj Branch Sub-basin [IBS]) on both modernizing irrigation and drainage operations as well as in integrated sub-basin planning and management (see figure S3). The components of the UPWSRP are shown in Table S1. The overall outcomes are designed to develop the enabling environment for the program by initiating and institutionalizing integrated water resource management considerations in a basin context at the State, Ghaghra-Gomti basin and at the JBS and IBS levels as well as initiating substantial reforms in the irrigated agriculture sector management.
Figure S2: UP Water Sector Restructuring Program Vision (overlapping investments over $1 billion over 15 years)

Note: The first project, UPWSRP-I is about $150 million and expected to be implemented over 5 years
Table S1: Key Components of the UP Water Sector Restructuring Project

<table>
<thead>
<tr>
<th>Component</th>
<th>Key Activities</th>
<th>Key Desired Outcomes</th>
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</table>
| A. Apex Institutions | Setting up apex water institutions in UP:  
- State Water Resources Agency (SWaRA), and associated State Water Resources Data & Analysis Center (SWaRDAC)  
- State Water Tariff Regulatory Commission (SWaTReC) | ➢ Initiate and institutionalize integrated water resources planning and management in a basin context  
➢ Develop knowledge base and analytical tools to support more rational water resources decision-making  
➢ Rationalize and Depoliticize water tariffs |
| B. UP Irrigation Department Reform | ➢ Human Resources Development (Structure, Training, MIS, VRS, etc.)  
➢ Business Process Reengineering (Modernization, Computerization, MIS, DSS, Training, etc.) | ➢ Modernize department functioning to enable more efficient and effective service delivery and integrate of environmental and social objectives and concerns into their operation  
➢ Rightsize UPID and reengineer business processes to increase effectiveness in a modern age, improve its bankrupt fiscal situation and improve client orientation |
| C. Piloting Reform Options in Irrigation and Drainage Operations (PROIDO) | [Rehabilitation and modernization of Irrigation & Drainage, agricultural intensification and diversification, integration of social and environmental concerns, water user associations, volumetric measurements, etc.]  
[In Water Resources Management (PROWaRM) [Jaunpur and Imamganj Branch Sub-basin Development and Management Boards – JBSDMB and IBSDMB, integrated water resources management planning and piloting including wetland management, canal hydro pilot, and rain water harvesting] | ➢ Sustainably improve rural livelihoods in the selected branch basins through improved irrigation service delivery, cropping intensification, diversification, participatory irrigation management, off-farm activities and access to knowledge and markets  
➢ Improve public health, access to water and livelihoods by piloting integrated sub-basin planning and management  
➢ Generate lessons from irrigation and drainage reforms and integrated water planning and management planning pilots for mainstreaming into the UP WSRP Program and for other similar programs |
| D. Preparation of UPWSRP -II | ➢ Topographic surveys, studies and assessments, project preparation | ➢ Improve sustainability and ownership of Program that can give long-term outcomes of sustainable rural livelihood improvement |

The project is proposed to be implemented as shown in Figure S4. The UPID will implement the UPID reforms and the irrigation and drainage reforms and the newly created SWaRA will initiate integrated water resources management and SWaTReC be an independent water tariff regulatory authority, both supported by the knowledge base and analytical capacity of SWaRDAC. The basin piloting (see figure S5) will be coordinated by the JBSDMB and the IBSDMB and the irrigation and drainage work at UPID by the JBSC and the IBSC. The link to agricultural knowledge, input and marketing issues will be provided by the ongoing Bank-financed UP Diversified Agriculture Support Project. The overall coordination of the program will rest with the Secretary, UPWSRP reporting to the Principal Secretary, Irrigation for UPID issues and the Program Steering Committee on other issues.
UP Water Sector Restructuring Project: JALPANI GIS

Figure S3: Sub-Basins where Reforms are to be Piloted

Figure S4: Implementation Arrangements
Figure S5: Irrigation System Basins Considered in UPWSRP
Environmental Scoping

The scoping exercise, largely influenced by consultations and initial spatial knowledge base assessment (including through multi-agency data collection and an extensive Geographic Information System [GIS] development and analysis), indicated the following key issues to be considered as part of the EA for the project:

- **Environmental Awareness**: generally weak at the UPID and related institutions involved with water management and irrigated agriculture, as well as with client farmers.
- **Environmental Knowledge Base**: the environmental knowledge-base is poor, sharing of information to help get a complete picture of environmental issues in a spatial context is extremely difficult, sharing and communicating information to various stakeholders is limited. No focal point institution to act as a clearing-house of water resources and basin management information.
- **Institutional Capacity**: the capacity of UPID and local stakeholders in integrating environmental information into decision-making is very limited. Access to expertise and effective partnerships in mainstreaming environmental issues into their functioning is poor, although there is surprising but scattered environmental expertise within UPID.
- **Lack of a Basin Approach**: a basin approach to integrated water resources management is absent both at the level of river basins as well as at the irrigation and drainage system level. An integrated consideration of surface and groundwater quality and quantity, salinization/sodicity of soils, recharge, drainage, flooding and waterlogging, public health concerns on water-related diseases (malaria, etc.) conjunctive use of surface and groundwater, wetland management, fisheries, etc. is absent. Safe water supply and sanitation coverage is extremely poor in the selected pilot areas. Lack of apex institution for basin resource allocation and regulation in the State.
- **Irrigation and Drainage Systems Reform**: limited exposure to integrated pest management, appropriate fertilizer use, soil fertility and nutrient management; low level of recognition of the importance of drainage; little diversification in crops grown; little modernization in tools and techniques used. Designs, construction and operations and maintenance operations can be made significantly more environmentally friendly.
- **Consultation**: Extremely limited consultation in water resources management and irrigation and drainage activities. Poor consultation culture at UPID. Little role of farmers in decision-making. Negligible experience in water user associations and private sector involvement (except contracting for construction and O&M) in managing irrigation and drainage operations.
- **Rehabilitation-related**: Lack of a clear R&R policy framework; Need to address issues of spoil disposal, materials handling, good construction techniques

Environmental Screening

Although the primary institutional reform focus and the limited physical investments for rehabilitation are not expected to produce major negative environmental impacts, the project has been categorized as Environmental Category A due to the new nature of investments proposed and due to the fact that the program seeks, through implementation of overlapping projects over 15 years, to change the water resources development paradigm in the Ghaghra-Gomti basin.

This EA only addresses the environmental issues in the first investment and is intended to develop a framework for their effective mainstreaming into the project, but places this in a strategic programmatic framework. A strategic Basin Environmental and Social Assessment is recommended to be prepared as part of the first investment to help set the framework for the entire program. However, it is expected that all future investment projects will have their own EAs as necessary.
Consultations

A substantial consultation process, especially over the past year has significantly influenced the design of the project and this EA. Consultations since the UP Water Policy was being finalized in 1999 and during the initial preparation missions helped in the development of the Terms of Reference for this EA. Since July 2000, joint consultations were held for determining the social and environmental concerns in the villages – about 30 villages were surveyed in the Jaunpur Branch Sub-basin area and about 33 in the Imamganj Branch Sub-basin area. The consultation tools used included household surveys, village profiling, gender analysis, focus group discussions, stakeholder consultations, and district stakeholder meetings. In addition, UPID staff at all levels were also extensively consulted during project preparation. A simplified version of the draft EA report findings were translated into local languages and discussed in stakeholder meetings in the JBS and IBS areas.

This consultative process was thought to be extremely useful in highlighting the local issues, institutional issues and local capacity to influence the overall project design. It also revealed the need for greater environmental awareness, and the need to build a “culture of consultation” at the UPID. The EMP recommends that this combined social-environmental consultative process be mainstreamed into the project, and that they precede any significant rehabilitation efforts in different parts of the two branch systems selected for piloting reforms.

Environmental Baseline

The EA presents a baseline of environmental parameters at a coarse level for the entire State and the Ghaghra-Gomti basin and at a finer level for the two branch sub-basin area (JBS and IBS) where physical investments will occur. An extensive set of data has been collected and analyzed from a variety of sources, including at the State and Central government level. The information base has been largely integrated into GIS and other electronic formats that form the core of the decision support systems envisaged as part of the project. The preparation of the EA has also indicated the poor environmental awareness in the water resources and irrigation sectors, patchy nature of the data, significant problems in inter-agency sharing of data and limited analytical institutional capacity. Recommendations for strengthening the environmental awareness, institutional capacity, spatial environmental knowledge base, analytical tools, and institutional coordination have been made in this regard.

Environmental Impacts

An analysis of the proposed project components has been carried out (see summary in Table S2) to determine potential positive and negative impacts to lead to enhancement measures to improve positive environmental impacts and mitigation measures to safeguard against potential negative impacts (as described later in the EMP section). This indicates overall that the project has a number of environmental concerns primarily related to the institutional capacity, environmental awareness, knowledge-base and some mitigation works and proposes a framework to address these issues effectively in the project. In addition, the table indicates the potential of the proposed project in enhancing the consideration of environmental issues both in the integrated water resources planning and management area as well as in the irrigation and drainage sub-sector. Social issues have been covered in the concurrent social assessment and the key recommendations (also summarized in the EA report) included in the project.
## Table S2: Key Environmental issues in the proposed UP Water Sector Restructuring Project

<table>
<thead>
<tr>
<th>Component</th>
<th>Key Environmental Objectives</th>
<th>Key Environmental Concerns</th>
</tr>
</thead>
</table>
| **Apex Institutions** | ➢ Mainstream environmental and social issues in Basin Planning and Management  
➢ Improve environmental knowledge-base, analytical tools and institutional linkages for environmentally and socially-sustainable integrated water resources management in a basin framework (including wetlands management, conjunctive groundwater-surface water management, in-stream flow allocation and enforcement for environmental and other purposes, water quality management, appropriate environmental and social assessment framework for projects impacting water resources availability and quality, etc.)  
➢ Include appropriate environmental issues in water tariff setting  
➢ Improve multi-stakeholder environmental awareness and encourage inter-agency cooperation and coordination on environmental issues | ➢ Poor capacity to integrate environmental issues into basin planning  
➢ Poor environmental knowledge-base and analytical tools and capacity  
➢ Poor basin development plans developed with little inclusion of environmental issues can exacerbate environmental issues such as waterlogging, salinization, resource conflicts, stakeholder consultation and participation, flooding, environmental allocation, etc.  
➢ Poor inter-agency linkages to share information and coordinate activities  
➢ If only up-front large strategic environmental study is carried out, there may be little ownership, associated capacity-building or be untimely |
| **UP Irrigation Department Reform** | ➢ Develop and implement simple and effective environmental guidelines for UPID activities  
➢ Develop Environmental knowledge base and appropriate modern analytical tools to facilitate informed decision-making at various levels in irrigated agriculture activities from UPID to farmer level | ➢ Poor capacity at UPID to address environmental issues; also poor partnerships  
➢ Environmental concerns will be lost in the focus on water delivery  
➢ Existing environmental knowledge base, analytical capacity and environmental awareness in UPID and among farmers is weak; Inter-agency information sharing is weak |
| **Piloting Reform Options** | ➢ Basin concept downscaled to the level of an irrigation canal and associated drainage  
➢ Technical knowledge base, analysis and Institutional coordination to achieve environmental outcomes  
➢ Public health benefits due to reduced malaria and other water-related diseases due to better water resources management and increased environmental awareness | ➢ Basin approaches to manage irrigated agriculture in UP is a new concept  
➢ Piloting reform options in specific areas could have unknown environmental impacts associated with it; future private sector operation options could also have environmental problems unless adequate safeguards are built-in  
➢ The lessons learned would not incorporate environmental performance due to poor baseline, monitoring & analysis |
| **Preparation of UPWSRP-II** | ➢ Selection of physical sub-basins includes environmental parameters  
➢ Environmental and social objectives included in the preparatory activities for UPWSRP-II | ➢ Areas selected poorly  
➢ Environmental assessments not carried out to desired quality  
➢ Environmental capacity of implementing agencies weak and environmental performance in this project poor, raising concern about environmental implications of the Program |
Analysis of Alternatives

The analysis of alternatives poses special challenges for projects such as these that focus on institutional reform and that are embedded in a programmatic framework. An attempt has been made in the EA to analyze the project from a number of different perspectives and a summary of the results are presented in Table S3 and Figure S4. The overall conclusion is that there is little alternative to systematic and systemic reform in the way water resources and irrigated agriculture are managed in Uttar Pradesh. Deep but achievable institutional reforms, a methodology strongly rooted in an integrated basin concept, strong consultation, modern and appropriate tools and techniques for traditional sectors, knowledge-based decision-making and principles of transparency, empowerment, subsidiarity and outcome-orientation are essential features in the project design as it has evolved during the preparation process. In the UPID, if change from a “vicious spiral” of low staff motivation and morale, ineffective work culture, poor service delivery, poor satisfaction of the water user clients, poor collection, an exploding fiscal deficit and poor investment in modernization and training is required, there is little alternative to substantially changing the way business is done. And this is as true from an irrigated agriculture viewpoint as from an environmental viewpoint.

Table S3: Analysis of Alternatives at the Component Level
* Selected alternative

<table>
<thead>
<tr>
<th>Type</th>
<th>Alternatives</th>
<th>Benefits</th>
<th>Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Project Scenario</td>
<td></td>
<td>* Business as usual – no pains!</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>* Business as usual – no gains!</td>
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<td></td>
<td></td>
<td></td>
<td>* No focal point for integrated water resources management – water conflicts increase across sectors and regions</td>
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<td></td>
<td></td>
<td></td>
<td>* “Vicious Spiral” of poor performance, poor water user satisfaction, poor willingness to pay, poor O&amp;M, high staff costs, increasing fiscal burden taking away resources from crucial sectors such as health, education and social services to subsidize irrigation</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>* Antiquated techniques for survey, design, construction, O&amp;M</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>* The development of a good environmental knowledge-base, analytical capacity, mainstreaming of environmental issues into large-scale water resources management and irrigated agriculture will be delayed even further resulting in continuously exacerbating environmental problems relating to waterlogging, salinization, water quality, water sharing, and social problems of lack of empowerment, and involvement in decision-making</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Spatial Context</th>
<th>Irrigation Systems Approach</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>* Focus on only one sector</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>* Limited focus ignores basin setting</td>
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<table>
<thead>
<tr>
<th>Spatial Context</th>
<th>Integrated, multi-sectoral Basin Approach</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>* Multiple sector focus; integrated river basin implementation</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>* No integrated basin and sub-basin plans developed yet; institutional capacity is weak</td>
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<table>
<thead>
<tr>
<th>Spatial Context</th>
<th>Initial focus on Irrigated Agriculture in an integrated Basin framework*</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>* Irrigated Agriculture sector crucial</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>* Basin approach scaled down</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Long-term basin planning needs to be developed for the overall ghaghira-gomti basin</td>
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</tbody>
</table>

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### Uttar Pradesh Water Sector Restructuring Project Draft Environmental Assessment Executive Summary

### Institutional Focus

#### Only focus on UPID
- Focussed development of only one institution
- Easier implementation

#### Additional focus on State- and basin-level management institutions for river basin planning, tariff regulation, etc. and links with agricultural institutions*
- Apex institutions created and inter-departmental linkages established
- More holistic and outcome-oriented than focussing on UPID alone; essential for reforming the irrigated agriculture sector in UP versus having a small-scale successful project.
- "Shared vision" multi-stakeholder planning and management
- Not an easy task to create new apex institutions and help inertial, fragmented agencies collaborate towards common development goals.
- Lack of proactivity within UPID to drive reforms and change management to completion
- Level of cooperation with allied departments and agencies in determining multi-sectoral strategies

### Setting of Project

#### Long-term Program Approach*
- Phased and learning approach possible (necessary when dealing with an institutional and physical setup for irrigation as large and complex as in UP).
- Initial focus on institutional reform would help not to divert attention to physical infrastructure improvements only.
- More sustainable approach – permanent and long-lasting changes
- "Root-and-Branch" approach sees next step after preceding one proves successful
- Initial physical rehabilitation benefits a smaller region.
- Difficult to obtain buy-in from government and financing institutions
- Scope needs to be adaptable and dynamic

#### Single Project Approach
- Can spread benefits over a larger area – infrastructure investment "fast-tracked"
- Not easy task to create new apex institutions and help inertial, fragmented agencies collaborate towards common development goals.
- Lack of proactivity within UPID to drive reforms and change management to completion
- Level of cooperation with allied departments and agencies in determining multi-sectoral strategies

### Physical Investments

#### Rehabilitate and modernize overall irrigation & drainage systems
- Large-scale implementation of reforms may result in benefits spread over large area.
- Expensive and does not address fundamental issues
- Unsustainable – without structural reform in institutions, structurally-rehabilitated infrastructure will deteriorate back
- Improper implementation may throw the entire irrigation system into chaos
- Time required for studies (e.g. topographic/remote sensing surveys and analysis) would be considerable and require a very long and very high-risk project

#### Adaptable Approach – scaling up after piloting reform options*
- More sustainable in the long-term
- Amenable to a phased and learning approach that would be more sustainable
- Lessons from piloting reform options in smaller areas could then be scaled-up
- Surveys, feasibility studies and institutional capacity required for next phase could be built into first project of program.
- More difficult to get institutional buy-in from areas that are not being covered under first project.
- Slower progress

### Technical

#### Surface Water Focus only
- Easy to focus on – consistent with current approach
- Could focus only on UPID
- Lack of shared vision planning and management with other departments
- Need to incorporate *planned* conjunctive use.
Conjunctive Surface and Groundwater Consideration*

- Approach would result in a more integrated water resources / basin planning approach
- Crop water requirements would be better met and productivity would increase
- Waterlogging (and associated productivity, sodicity and public health problems) would be reduced
- There is little integrated assessment of surface and ground water data and analysis.
- Operational irrigation rosters would reflect availability and capacity to tap groundwater, changes in cropping patterns, demands, etc.

Separate Cells

- Greater focus and more easily managed as an environmental group
- Poor mainstreaming and assimilation of activities and recommendations into UPID
- High risk of creating an “enclave”
- Needs good career development structure

Mainstreamed into Team*

- Knowledge transfer and reforms permanence more assured
- Wider acceptance of UPID of environmental management
- Would facilitate teamwork and exposure to environmental issues
- Lack of expertise and hesitancy of UPID to bring this in from outside
- Needs good career development structure

Environmental Management Plan (EMP)

Table S4 summarizes the key provisions made in the EMP for the project. Key EMP features include:

- Emphasis on covering all aspects of a project – including expected induced impacts
- Continuation of all aspects of the environmental assessment into the project at smaller scales – this includes substantial consultation, screening and scoping (with screening process for each new activity and new location) baseline data collection and analysis (through spatial knowledge base creation and analysis), analysis of alternatives (e.g. type of rehabilitation for specific branch, distributary, minor and outlet), further analysis (e.g. additional studies as required) and access to expertise.
- Integration of social and environmental issues and their integration into the project (e.g. through consultation, joint walkthroughs, etc.)
- Emphasis on targeted capacity-building (through an extensive training program, access to consultants, partnership-building and an improved knowledge-base and communication network)
- Emphasis on environmental awareness (at the new apex institutions, the UPID, the DASP, the water user clients and others)
- Development of a strategic framework (through a Basin Environmental and Social Assessment and associated management plan as part of the project for the entire Ghaghra-Gomti basin, where future investments in the proposed program will be targeted)
- Requirement for all new activities to develop an EMP prior to implementation (e.g. rainwater harvesting, wetland management, etc.)
- Emphasis on the systematic development of an environmental knowledge-base and analysis capacity as well as regular monitoring and evaluation and its integration into decision-making

There will be a cost involved in implementing the EMP and this has to be included in the UPWSRP programme budget. A summary of EMP operational costs are estimated in TableS5. A number of estimates have been made in the development of these costs. General hardware costs like office computers, transport, equipment, etc, staff and UPID administration costs are not included in the costs estimate which is primarily concerned with those costs directly attributable to setting up and running the EMP. The project components have considerable flexibility and hence, the EMP cost allocation also has to be reasonably flexible. The EMP running costs for UPWSRP year two to year four would depend very much on progress in year one and future requirements. Some of the year one costs are single outlays so won't be repeated while others will be recurrent expenditures. In broads terms it can be assumed that to run the EMP in year 1 will cost about 22,000,000 and for years two to year five would cost about 30,000,000 INR or about 7,500,000 INR per year, leading to a total cost of approximately 53,000,000 INR or about US $ 1.1 million. It is estimated that this would provide a reasonable level of comfort in achieving the positive environmental benefits targeted by the project while ensuring compliance with Bank, GOI and GOUP safeguards on mitigating negative impacts.
**Project Objectives**

- Increased productivity of water
- Increased and sustainable agricultural production
- Improvements in the living standards of rural poor

**Strategic Objectives**

- Improving governance and revamping fiscal policy
- Restructuring infrastructure
- Strengthening human resources
- Supporting rural and urban development
- Tackling social and environment issues

**Sectoral Requirements**

- Water sector reform and capacity building at state level
- River basin planning
- Reform and capacity building of the UPID
- Studies, designs and implementation of pilot I&D reforms
- Studies and design of I&D improvement works

**Development Proposals**

- Creation of institutional structures
- Multi Sectoral water resources and environmental management
- UPID reform and capacity building
- Piloting reform options for I&D operations
- Irrigated agriculture intensification and diversification programme
- Feasibility studies and preparation of activities for the next phase
- Human resources development

**Alternative Approaches**

- Attain project objectives through DOA or another agency
- Invest in public sector restructuring and market forces
- Restructure and privatise the UPID
- Divide UPID up into smaller management units and reform
- Reform institutional structures and leave I&D operations
- Investment channelled through UPID and leave restructuring

**Alternative Development Strategies**

- Strengthen and implement I&D operations through DOA
- Establish and implement via agricultural investment vehicle
- Restructure UPID and divide and run in smaller units
- Amalgamate UPID with DOA and form a new joint agency
- Set up special unit within and implement through UPID
- Rehabilitate I&D operations and privatise as a whole

**Evaluate Environmental Implications of Alternative Strategies**

- Retain core UPID staff and sell assets
- Restructure UPID and divide into smaller units
- Amalgamate UPID with DOA and form a new joint agency
- Use traditional approach and implement through UPID unit

**Screen Alternative Strategies**

- Difficult to secure the necessary government approvals
- Legally complicated and would involve complex regulation
- Complementarv water resources and environmental provisions still required
- Unlikely finance could be raised without guarantees and subsidies

- Resources planning and environmental protection provisions fragmented
- Financially attractive with significant staff advancement benefits
- Would focus responsibility clearly on UPID as local service providers
- Strong objections likely from senior management

- Improved and laudable approach to irrigated agriculture
- Move away from water provision to agriculture environmentally dangerous
- Dilution of river basin management and environmental protection principles wrong
- Better coordination and joint management to ensure efficient agro-chemical use

- Reform of UPID abandoned and importance of environment on I&D operations lost
- Inefficient with concentration on construction not environmental sustainability
- Without restructuring parcellar river basin planning proposals will not succeed
- Short term I&D operations will not solve UPID's long term problems

- Analysis of project objectives indicates no measurable environmental advantages in pursing an alternative strategy

**Figure S4: Analysis of Alternatives Flowchart**
Table S4: Key Environmental Issues In the Proposed UP Water Sector Restructuring Project

<table>
<thead>
<tr>
<th>Component</th>
<th>Principal Environmental Enhancement/Mitigation Measures in EMP</th>
<th>Key Implementing Institutions (with Consultant assistance as necessary) &amp; Timeframe</th>
</tr>
</thead>
</table>
| Apex Institutions | 1. Major effort at building environmental capacity at SWaRA for river basin planning, allocation and regulation  
2. Development of a significant environmental knowledge-base and analytical capacity on the State and especially on the Ghaghra-Gomti basin at the SWaRDAC to support the consideration of environmental issues at SWaRA and SWaTReC  
3. Data-sharing, institutional mechanisms built-in for inter-agency coordination  
4. A Strategic Basin Environment & Social Assessment to be conducted as part of Project to inform Basin planning, develop knowledge-base, build capacity and generate ownership  
5. Provision for identified and unidentified Special Studies and access to environmental expertise  
6. Promotion of Environmental awareness, communication, etc. (e.g. through website, State of Water Environment Report, multi-media events, etc.)  
7. Encourage extensive environmental training activities within and outside the Apex Institutions | Note on Timeframe: All activities throughout project except where indicated  
1. State Water Resources Agency (SWaRA)  
2. State Water Resources Data and Analysis Center (SWaRDAC), SwaRA and State Water Tariff Regulatory Commission (SWaTReC)  
3. SWaRDAC  
4. SWaRA: Completed by Year 3 – preparation trigger for next investment in program  
5. SWaRA  
6. SWaRA with assistance from SWaRDAC  
7. SWaRA |
| UP Irrigation Department Reform | 8. Significant capacity-building (including staffing, training, access to expertise, partnerships, etc.) at the UPID to mainstream environmental issues in its activities  
9. Build environmental knowledge base for UPID, integrate environmental issues in the spatial Decision Support Systems to be developed  
10. Development of Environmental Guidelines for UPID operations  
11. Provision for identified and unidentified Special Studies and access to environmental expertise  
12. Promotion of Environmental awareness, communication, training, etc. (e.g. through website, media activities) for irrigation and drainage stakeholders  
13. Basin approach decentralized to irrigation and drainage networks  
14. Environmental capacity-building at the Jaunpur and Imamganj Branch Sub-basin | 8. UPID  
9. UPID (with assistance from SWaRDAC)  
10. UPID  
11. UPID, DASP  
12. UPID  
13. UPID, Jaunpur Branch Sub-basin Development and Management Board |
### Pilot Reforms Options

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<tbody>
<tr>
<td>15.</td>
<td>Safeguards Screening &amp; Mitigation Measures for all piloting activities – frameworks also to be developed for all relevant new activities that could potentially have environmental impacts; Clear procedures in place to screen impacts, implement mitigation measures, monitor impacts</td>
</tr>
<tr>
<td>17.</td>
<td>The Diversified Agriculture Support Project (DASP), another recent Bank-supported project is to implement according to its EMP, which will be regularly evaluated for effectiveness</td>
</tr>
<tr>
<td>18.</td>
<td>Provision for identified and unidentified Special Studies and access to environmental expertise</td>
</tr>
<tr>
<td>19.</td>
<td>Promotion of Environmental awareness, communication, training, etc. (e.g. through multi-media activities, computer kiosks, demonstration plots, field visits, etc.) for basin stakeholders</td>
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</tbody>
</table>

### Preparation of UPWSRP-II

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<tr>
<td>20.</td>
<td>Development and evaluation of achievable and substantive triggers on environmental performance in UPWSRP-I</td>
</tr>
<tr>
<td>21.</td>
<td>Integrated environmental and social assessment for UPWSRP II that would help identify all key environmental and social issues</td>
</tr>
</tbody>
</table>

(JBSDMB) and Imamganj Branch Sub-basin Development and Management Board (IBSDMB)

14. JBSDMB, IBSDMB

15. UPID, JBSDMB, IBSDMB, DASP (detailed screening and mitigation framework to be developed, agreed with the Bank and all proposed activities subjected to it before commencement of work)

16. UPID, JBSDMB, IBSDMB, DASP

17. DASP (with Consultant support)

18. UPID, JBSDMB, IBSDMB, DASP

19. UPID, JBSDMB, IBSDMB, DASP

20. UPID, SWaRA

21. UPID, SWaRA
### Table S5: Estimated Costs of EA Implementation

<table>
<thead>
<tr>
<th>Entity</th>
<th>Cost Category Description</th>
<th>Year 1</th>
<th>Years 2 to 5</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Amount (INR)</td>
<td>Amount (INR)</td>
</tr>
<tr>
<td>State Water Resources Agency (SWaRA)</td>
<td>Production of environmentally specific literature</td>
<td>200,000</td>
<td>100,000</td>
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<tr>
<td></td>
<td>Water environmental public awareness campaign Service environmental steering committee Training</td>
<td>250,000</td>
<td>100,000</td>
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<td></td>
<td>25,000</td>
<td>100,000</td>
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<tr>
<td></td>
<td>500,000</td>
<td>1,000,000</td>
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<tr>
<td>State Water Tariffs Regulatory Commission (SWaTReC)</td>
<td>Support for tariff environmental coordinator Training</td>
<td>50,000</td>
<td>200,000</td>
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<tr>
<td></td>
<td>500,000</td>
<td>1,000,000</td>
<td></td>
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<tr>
<td>State Water and Resources Data Analysis Centre (SWaRDAC)</td>
<td>Build environmental data base into MIS Build spatial technologies capacity Training</td>
<td>100,000</td>
<td>40,000</td>
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<tr>
<td></td>
<td>75,000</td>
<td>125,000</td>
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<td></td>
<td>600,000</td>
<td>1,200,000</td>
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</tr>
<tr>
<td>Ghagra - Gomti River Basin Entity</td>
<td>Service environmental cell Production of environmentally specific literature Social assessment studies Additional studies Service environmental liaison committee Training</td>
<td>250,000</td>
<td>1,000,000</td>
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<tr>
<td></td>
<td>200,000</td>
<td>160,000</td>
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<td>2,500,000</td>
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<td>2,000,000</td>
<td>4,000,000</td>
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<tr>
<td>Irrigation Department</td>
<td>Service Environmental Engineer and team Project management and database additions M&amp;E data measuring items MIS and spatial technology additions Maintain disaster preparedness strategy Training</td>
<td>250,000</td>
<td>1,000,000</td>
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<td>25,000</td>
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<td>3,500,000</td>
<td>7,000,000</td>
<td></td>
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<tr>
<td>Diversified Agriculture Support Project</td>
<td>EMP implementation for activities undertaken by DASP for this project</td>
<td>500,000</td>
<td>3,000,000</td>
</tr>
<tr>
<td>Monitoring &amp; Evaluation</td>
<td>Incremental M&amp;E [Note: Most M&amp;E budgeted separately]</td>
<td>500,000</td>
<td>1,000,000</td>
</tr>
</tbody>
</table>

**Contingencies 10%:** 2,027,500 2,707,500

**Total:** 22,302,500 29,782,500