Guidelines for the preparation of PIP activities and budgets at State level

General comments and recommendations for PIP development

- *Tentative budget allocations:* Generally, PIP budgets requested by the IAs substantially exceed the availability of funds under HP3. Therefore, agencies are requested to first adjust and correct their PIP budgets in line with their realistic needs for investment in WRIS/HIS infrastructure and services (keeping in view the discussions with the WB Team), while also keeping in view that building the optimal WRIS/HIS system is a long-term process and need not be fully completed during HP3; in some States the process already started in 1996! Agencies are requested to derive from this full-scale desirable PIP a second, downscaled Priority PIP, matching the tentative budget allocation provided to each agency and keeping in view the guidelines and recommendations provided in this note. This Priority PIP aims to guide MoWR-RD&GR and the States in prioritizing state activities under the initial budget allocations, keeping in view State priorities in water management.
- *Future budget reallocations:* Budgets of agencies demonstrating good performance in project implementation can over time be increased based on savings from less performing agencies. Therefore, all agencies should make at least token budget allocations (as placeholders) for all budget lines of possible future importance, to facilitate future budget reallocations.
- *Time distribution*: It is recommended to divide the budget into two parts: 50% to 60% for years 1 -4 (stage 1) and 40% to 50% for year 5-8 (stage 2). This budget partitioning reflects the need to procure more costly hardware during the first four years of the project and the need to develop less costly water management tools and programs in stage 2. Costly investments in special project such as SCADA systems for irrigation system management may be prepared during stage 1 and implemented during stage 2. The project will become effective during FY2015, with little expenses in FY2015 other than retroactive funding of preparatory activities (primarily under component D). Procurements for stage 1 would start in earnest in FY2016 and for stage 2 in FY2020 (Fiscal Year refers to India's FY, starting on April 1st).
- *Allocations for project components:* To date, PIPs reviewed have broadly focused on installing large numbers of expensive equipment, building new offices and related facilities, and funding vehicles and incremental staff cost. As the goal of HP3 is to build capacity and tools, and to support data usage for improved water management, insufficient importance has thus far been given to the utilization and application of data under components B and C. Generally, allocations to components B and C need to be increased and costs under components A and D may be reduced accordingly. For a general guide, tentatively allocations across components for **new States** could be in the range of: 40% for component A, 5% for component B, 15% for component C, and 40% for component D (usually some new buildings/offices are required). This is not a hard rule and investments during stage 1 may focus more on component A than during stage 2 (establishment of network). **For the existing HP-I/II States** the focus should be more on components C (including an extension of real-time networks for flood forecasting and other purposes under component C) and less on component D. Roughly the distribution for these States could be 40% for component A, 5% for B, 30% for C and 25% for D (again this is not a hard rule).
- *Incremental staff cost*: Some agencies have included extra cost of government staff (such as costs incurred through promotions, etc.) and new permanent staff as incremental staff cost. This is not acceptable to GOI. It is necessary to limit incremental staff cost to the cost of **temporary staff cost**, with a focus on specialist staff such as IT experts and other professionals for data centres, chemists for laboratories, temporary data entry staff, etc. As a rule of thumb, cost of incremental staff (sub-component D5.1) should not exceed 10% of the total budget.
- *Unit cost rates:* Unit cost rates need to be reconciled with the rates prepared and distributed by the Bank's team for guidance of the agencies. One may deviate from these unit rates, if they are demonstrably unrepresentative for the State (e.g. the cost may be higher in North-East India than elsewhere, or cost of drilling of piezometers may vary across India depending on availability of contractors and location). Unit cost rates for international and national consultants have also been included.
- *AMC and insurance for new equipment*: It has been decided to include two years warranty and 5 years mandatory AMC in the bid documents. Given that not all equipment will be procured by the second year of

the project and the two years warranty period, the average period of AMC to be paid by agencies during the project period will be less than 5 years under the project. The balance will spill-over project closure. It was decided to include for the time being 35% extra cost for O&M of the equipment (5 years in the project period @ average of 6% for AMC and 1% for insurance). Extended warranty may be another option. Since AMC will be part of the bidding document and contract, costs of AMC should be added to the cost of Goods instead of Operation Cost.

- *Taxes:* It has been decided to add for the purpose of budget estimation 12.5% for VAT/service taxes; this is included in unit cost rates prepared by the Bank's team.
- *Time distribution of individual cost elements:* Noting that basic cost are increased with 35% for AMC, only 1/1.35 = 74% of total cost are disbursed upfront, for example in year 2. Warranty will cover years 3 and 4 and AMC (0.35/1.35 = 26%) will be paid in years 5 and beyond. This 26% of the total cost thus needs to be allocated to years 5 to 8 (6.5% of total cost each year).
- *Contingencies and price escalation:* Ten (10%) should be added for contingencies and price escalations "at the bottom" of the cost table.
- *Annual fees for telemetry systems*: Where relevant annual VSAT, GSM or other telemetry fees need to be included under Operation Cost. Annual fees for VSAT and GSM are provided in the document with unit cost rates provided by the Bank's project team.
- *GW real-time monitoring networks*: A rule of thumb under HP-II has been to equip only 10% - 15% of the DWLR in piezometers with telemetry. However, since the cost for the telemetry part using GSM has become small, one can increase this percentage significantly. The transmission frequency for DWLR is low and not critical during (e.g. extreme flood events). Therefore, DWLR with telemetry can be battery operated and use the cheapest transmission technology (GSM). DWLRs using this technology are denoted in the Unit Price Table under the Groundwater Equipment Section as "DWLR + GSM telemetry (GW)".
- *Optimization of real-time SW monitoring networks*: The present approach to implement *only* real-time reporting monitoring stations implies a large cost increase compared to previous manually operated systems, even though savings will be made in future O&M cost. Firstly, there is thus a need to optimize and possibly reduce the proposed networks of real-time reporting stations. Stations installed by other Departments (e.g. Agriculture) should also be considered and/or incorporated. Real-time stations with VSAT may be limited to areas with occasional heavy rainfall and risk of flooding and include important reservoirs. Real-time stations in areas with low rainfall and for purposes whereby immediate transmission is less critical may use GSM technology for telemetry. Rain gauges, water level recorders, AWS, and gate sensors located at one location can use the same telemetry system, thereby yielding significant cost reductions. Secondly, the project may introduce half-hourly rainfall estimation through Meteosat satellite monitoring (particularly for flood forecasting purposes), for which the requirement for real-time rainfall/climate stations for calibration of the rainfall estimation algorithm is rather limited (only one station per 10,000 km^2). Precipitation estimates are then based on "cold cloud temperatures" and calibrated through sparse real-time ground stations. Given other requirements one may have for real-time observations, this would be too sparse a network since one also needs real-time measurements at e.g. reservoirs or in major irrigation schemes. However, it does show a huge scope for real-time network reduction in case we would use satellite based technology for rainfall estimation for flood forecasting purposes. One may consider in stage 1 for example a density of one AWS/DRG per 2,500 km^2 in regions for which real-time information on climate and flood forecasting would be important, as well as additional stations for reservoir sites, in conjunction with a pilot application of rainfall estimation based on "cold cloud temperatures".

Comments, observations and recommendations regarding specific components

Component A: Improving In-situ Water Resources Monitoring Systems (IWRMS)

Comp.	Surface Water	Groundwater
A1.1	***Expand and upgrade water resources monitoring systems*** ➢ Monitoring systems may include: • Weather: automatic weather stations (AWS), full climatic stations (FCS, the same as AWS without telemetry), rainfall and snow gauges; telemetry for flood related monitoring should be VSAT based	

<table>
<tr><td></td><td colspan="2">(XC band) for maximum reliability; GSM based telemetry is sufficient for drought monitoring and regular rainfall monitoring (where risk of floods is small).
• Rivers: automatic water level recorders (AWLR), discharge measurements, water quality monitoring, assessment of rating curves, etc.; VSAT telemetry should be used for stations important for flood forecasting and control.
• Groundwater: monitoring of water levels and water quality; GSM technology is adequate telemetry
• Reservoirs/tanks: water levels, gate positions, outflows and spillways
• Water quality: automatic water quality station (AWQS) and field kits; GSM technology is adequate telemetry for an AWQS station.
• Sediment: transport and load monitoring
• Monitoring of water diversions, water use (abstractions) and water distribution and losses in irrigation systems
➢ Services for installation and commissioning are to be included in contracts for goods (included in unit rates provided by the Bank team). Generally, one or two years warranty and six to seven years annual maintenance need to be included in procurement documents. Consultancy services may be needed for the design and development of real-time monitoring systems and for assisting the State to make the central data receiving and processing systems operational.
➢ Data Centres need to be equipped to enable the reception of real-time data and create the data base under the RTDAS. Cost for VSAT and GSM Master Stations are provided in the unit rates table.
➢ While AMC cost (35%) would be added to the cost estimates under goods, the PIP should include other O&M cost under Operation Cost (incl. chemicals and glassware for WQ laboratories) if relevant
➢ Where relevant annual telemetry fees need to be included under O&M for VSAT and GSM telemetry.</td></tr>
<tr><td></td><td>➢ Surface Water Departments need at least one VSAT Master Station (dish, data modules and data base) for receiving all real-time data at the State Data Centre. It would also require some specialized consultancy.</td><td>➢ The transmission of DWLR data may be GSM based, through cloud server (no master station required, other than data modules and base software).
➢ If relevant, specialized geophysical equipment for groundwater exploration and/or aquifer mapping should be proposed under A3. 4.</td></tr>
<tr><td>A1.2</td><td colspan="2">Set monitoring standards: water quantity/quality, QAQC methods
➢ During HP1 and HP2 water quality standards and Analytical Quality Control (AQC) procedures and monitoring protocols were developed. Central agencies will update these standards under HP3 and state laboratories need to implement these standards. Application of these procedures needs to be strengthened; WQ laboratories need to be rationalized; outsourcing of WQ testing may be considered.
➢ Similarly, agencies should re-vitalize the practise of inter-agency data sharing and data validation.
➢ States should provide budget for implementing an AQC program for its labs and supporting inter-agency data sharing and validation. This could be in the form of consultancy services for a WQ specialist and IT specialist, and/or cost of training. The cost of accreditation/certification of at least one State laboratory may also be added.</td></tr>
<tr><td>A1.3</td><td colspan="2">Community based monitoring and water management
➢ Piloting of community based, mobile monitoring systems for small streams, groundwater, water bodies, flooding, and embankment status (crowd sourcing). This may include the procurement of mobile based services and mobilizing communities for the monitoring of local water resources (NRSC/ISRO has already piloted this approach).</td></tr>
<tr><td></td><td>➢ It is recommended to provide at least some budget, as place holder, for community based monitoring of local streams and water bodies.</td><td>➢ It is recommended to provide budget for initiating pilot project(s) on sustainable GW management with community participation (along with aquifer mapping under sub-component A3. 4).</td></tr>
<tr><td>A2.1</td><td colspan="2">Digitize and integrate paper data, maps and documents</td></tr>
</table>

	➢ Budget may be provided for outsourcing or hiring technical staff to digitize existing maps, and perform data entry of historical data, to assist the agency with building its historical data archive.	
A2.2	***Develop spatial river basin information systems including themes provided in India-WRIS*** ➢ Spatial themes may include, but are not limited to, water bodies and their usage, canal system networks, groundwater systems, land use, irrigation systems, and inventories of water pollution occurrences and sources. ➢ Budgets may cover services to digitize maps or procure imagery; agencies may seek help of NRSC	
A2. 3	***Upgrade centralized and web-based data entry, data storage, data management and data dissemination systems, including e-SWIS, e-GEMS, e-WQIS and India-WRIS*** ➢ This sub-component aims to introduce the new software in all agencies and to (re)establish and strengthen the data sharing and data validation protocols across state and central agencies. State agencies should provide budget for additional consultancy and training cost for familiarizing its staff with the new e-SWIS (Surface Water Information System), e-GEMS (Groundwater Estimation and Management System) and e-WQIS (Water Quality Information System) software and for strengthening data sharing and validation protocols across state and central agencies. ➢ ITC hardware would be provided under D1. 4 and costs concerning India-WRIS under B2. 1.	
A3.1	***Reservoir sedimentation surveys***	
	➢ Outsourcing through the procurement of services (category "goods & non-consulting services"; not "consulting services")	Not applicable
A3.2	***Bathymetric river surveys in critical areas***	
	➢ Outsourcing through procurement of services (category "goods & non-consulting services"; not "consulting services")	Not applicable
A3.3	***Assess water quality/waste loads*** ➢ Design a monitoring system to assess loading, fate, and transport of constituents within limited water quality hotspots ➢ , A token budget may be included for WQ assessments as place holder.	
A3.4	***Groundwater exploration and aquifer mapping***	
	Not applicable	➢ GW exploration and aquifer mapping may be initiated by most States, at least on pilot basis and in conjunction with activity A1. 3. CGWB should be consulted regarding unit cost rates ➢ States need to match their hotspots with CGWB in order to avoid duplication
Component B: Improving Spatial Water Resources Information Systems (SWRIS)		
B1.1	***Development of DEM for the entire country*** ➢ Development of DEM for improved flood hazard mapping and planning purposes ➢ High **resolution surveys such as LIDAR for flood prone areas and for flood risk mapping** ➢ **Provision of h**igh resolution remote sensing imageries and other supplementary information to develop DEM for selected areas ➢ This category mainly applies for Central Agencies, though States may include budget for DEM of selected priority areas	
B1.2	***Temporal and spatial Earth Observation (EO) products*** ➢ Temporal assessments based on EO products may include, but not be limited to: • Estimation of precipitation, snow cover and snow melt, soil moisture, land use, and actual evapotranspiration (ET) • Satellite based monitoring of cropping patterns, crop conditions, droughts, and water supply conditions in irrigation systems • Satellite based monitoring of water logging, water storage in tanks, and other water bodies. ➢ If unknown, it is advised that IAs provide a token budget for the procurement of EO products	

B1.3	***Develop multiple short- and medium range weather forecasting products*** ➢ This category mainly applies for Central Agencies	
B2.1	***Strengthening India's National India-WRIS web-based portal; introduce State Chapters to India-WRIS*** ➢ Implementation of Central and State data storage and dissemination systems (software; cloud computing and processing, etc.); integrate India-WRIS with monitoring data from radars and satellite products, curated spatial information from legacy data and surveys. Requires an active exchange platform between states and center (to be spearheaded by CWC). ➢ Provide easy access to CMIP5 climate change projections for India for the purpose of Climate Risk Assessments (to be spearheaded by CWC). ➢ States need to provide budget for creating a State Chapter for India-WRIS. IT equipment and office infrastructure would be provided under D1. 2/1. 4. This item may focus on special consultancies for setting-up the India-WRIS SW and GW data bases for the State, assistance with initial data processing, training and O&M, including development of the Department's website for data dissemination. Cost will relate to integrating India-WRIS in the State's data management and processing systems.	
B2.2	***Development of a web-based hydrological modeling system for the entire country*** The envisaged Hydro-India rainfall-runoff model can possibly be based on the existing Variable Infiltration Capacity (VIC) model of NRSC and will support States in design studies, DSS applications, and flood forecasting.	
	➢ Development of hydrological model(s) for a State should be phased in conjunction with the development of flood forecasting systems. CWC is expected to prepare the required models in due time for the entire country, but States should not wait for CWC if it wants to initiate flood forecasting soon.	Not applicable
B3.1	***Provide public-domain information services*** ➢ Budget should be provided for public domain services, including the preparation of web-portals, apps for the dissemination of data available with the State, apps allowing the integration of online data available in other sources, links to digital-online libraries, bulletins (e.g. on flood forecasting) and a variety of on-line products (yearbooks, interactive atlases, flagship products, and visualization dashboards.	
Component C: Promoting Water Resources Operation and Management Applications (WROMA)		
C1.1	***Planning and Decision Support Systems (DSS)*** Get planning Dept involved ➢ This component concerns DSS applications for river basin planning; water balance assessments; development and pilot-based introduction of community based groundwater management, climate risk assessment, water quality management, watershed planning, scenario analysis for investment planning; improvement of design tools such as Hydrological Design Aids (HDA). ➢ The application of DSS systems shall be included by all Implementing Agencies.	
C1.2	***Stream Flow/Flood Forecasting Systems for short-term and seasonal forecasts***	
	➢ States are encouraged to develop Flood Early Warning Systems (FEWS), including real-time monitoring and data acquisition, a flood forecasting and reservoir operation modeling system, feed-back system to reservoir operators, and real-time dissemination of forecast on the internet. Good examples have been established under HP2 by BBMB and Maharashtra-SW. ➢ Seasonal forecasts to support irrigation and reservoir operation planning would be	➢ Groundwater Departments would use seasonal forecasts for irrigation planning, drought management, etc.

	provided by Central Agencies.	
C1.3	***Operational Management Systems*** OMS systems are used for improving the management and operation of reservoirs and irrigation systems, flood preparedness, spill management, and the operation of other water infrastructure	
	➢ States may wish to pilot Operational Management Systems for reservoirs, large irrigation systems, etc. including SCADA systems for enhanced irrigation system management.	Not applicable
C2.1	***Flagship Knowledge Products*** ➢ Flagship products include River Basin Management Plans (RBMP), a report on the Status of India's Water Resources, etc. Flagship products offer a good vehicle for the utilization of water data, and water resources planning needs to be initiated by all agencies under HP-III. ➢ The cost of preparation of at least one RBMP may be included, with cooperation between Surface Water and Groundwater Departments.	
C2.2	***Purpose Driven Studies (PDS)*** ➢ PDS studies may include information generation and studies of specific issues, including e.g. Climate Risk Assessments of present and planned water resource infrastructure. ➢ PDS studies need to be clearly defined and should be included by all agencies, as one way to put the data collected under HP to good use.	
Component D: Strengthening Water Resources Institutions and Capacity Building (WRICB)		
D1.1	***Establishment of the National Water Informatics Center*** ➢ Only for Central Agencies or MoWR-RD&GR; States would budget related expenditures under D1. 2 ➢ The National Center will be strengthened with Deputed Experts. This would lead to an integrated Center of Excellence for water resources knowledge and analysis, including use of modern modeling tools and the provision of national helpdesk services. ➢ The Project support building requirements, equipment procurement, hiring trained manpower, and exchange with international/national agencies	
D1.2	***Establishment of State Water Informatics Centers; upgrading WALMIs*** ➢ Budget should be provided to upgrade State Data Centers established under HP-I/II and existing facilities at new States to State Water Informatics Centers. ➢ Budget should provide for facilities, trained manpower and exchange with (inter)national agencies; ➢ WALMIs may also be strengthened under this component, to enable them to provide technical support to States, e.g. regarding the improvement of irrigation system management.	
D1.3	***Upgrading of regional and (sub-) divisional offices and vehicles*** ➢ Upgrading of divisional data centers, office and laboratory infrastructure and vehicles ➢ ITC equipment is to be provided under D1. 4	
D1.4	***Institutional Modernization Support, incl. ICT systems for offices and Data Centers*** ➢ Procurement of information management tools, e.g. ICT including cloud-based systems, videoconferencing systems, displays, softwares, manuals, and information systems design ➢ Procurement of satellite imagery may be included as well (if not yet included under other sub-components).	
D2.1	***Policy Support*** ➢ Policy on data pooling, data quality management, enhancing public-domain information. ➢ IAs may provide a token budget for this activity, to enable future participation.	
D2.2	***Strengthened Partnerships and study tours*** ➢ Strengthened partnerships with earth observation data and other knowledge providers, open data initiatives, academia, CSOs, internships/visiting experts/development assignments ➢ International exchange programs and overseas and domestic study tours ➢ Care should be taken not to over-budget provisions for international study tours	
D3.1	***Annual Water Resources Knowledge Forum***	

	➢ This would support showcasing of the best of what India has to offer and facilitate knowledge exchange; also various competitions may be introduced (e.g. Online Tools, Appathons, Hackathons). ➢ At least a token budget should be provided as place holder.
D3.2	➢ Class room training/meetings and multi-media distance learning ➢ Costs include curriculum development, technical courses, refresher courses, training/meetings in the use of readily available EO products, etc. Multi-media distance learning may include videoconferencing, e-learning (e.g. self-paced courses, webinars, MOOC), vendor fairs, regular video & audio podcasts, documentaries. ➢ The cost of regular/standard training should be provided under D3. 2 and not under other components. The cost of very specific training, e.g. related to specialized equipment, may be included under the sub-component detailing the specialized goods to be procured. ➢ Budgets may also be provided for HIS awareness raising activities and the production of HIS promotion materials.
D4.1	➢ Establishment of a permanent WRIS/HIS Coordination Secretariat (CS) at MoWR-RD&GR and Project Management Units (PMU) at State level. The cost of operation of the PMU at State level can be included, unless provided elsewhere
D4.2	➢ Technical Assistance and Management Consultancy (TAMC) at WRIS/HIS-CS (central) and State level for extensive technical assistance and support for procurement, financial management, MIS and M&E services; general TA support at State level. ➢ States should include budget for hiring occasionally short-term consultants to assist with project design and implementation, development of India-WRIS at State level, data processing at the State Data Centre, development of web-portals, procurement, MIS and similar activities requiring outside expertise, particularly when adequate support cannot be timely obtained through the TAMC arranged by PCS.
D5.1	***Incremental staff cost for O&M of HIS/WRIS*** ➢ Incremental staff cost may be limited to the cost of temporary technical staff cost, with a focus on specialist staff such as IT experts and other professionals for data centres, chemists for labs, etc. Cost of incremental staff should not exceed 10% of the total budget.