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PROGRAM NAME: SUSTAINABLE, JUST AND PRODUCTIVE WATER RESOURCES DEVELOPMENT IN WESTERN NEPAL (DIGO JAL BIKAS)

Semi-Annual Report

Reporting Period – 1 April, 2016 to 31 September, 2016

Submission Date: 31 October, 2016

[Contract/Agreement] Number: AID -367-IO-16-00002

Activity Start Date and End Date: 1 April 2016 – 31 March 2019

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I. PROGRAM OVERVIEW/SUMMARY

| | |
|---|---|
| Program Name: | Sustainable, just and productive water resources development in Western Nepal (“Digo Jal Bikas”) |
| Activity Start Date and End Date: | 1 April 2016 – 31 March 2019 |
| Name of Prime Implementing Partner: | International Water Management Institute (IWMI) |
| [Contract/Agreement] Number: | AID -367-IO-16-00002 |
| Name of Subcontractors/Sub-awardees: | Duke University Kathmandu University |
| Major Counterpart Organizations | Department of Irrigation(Dol) Water and Energy Commission Secretariat (WECS) National Planning Commission (NPC) |
| Geographic Coverage (landscape, province(s) and countries) | Karnali, Mahakali and Mohana Sub-basins |
| Reporting Period: | 1 April 2016 – 31 September 2016 |

1.1 Program Description/Introduction

The overall goal of the “Sustainable, just and productive water resources development in Western Nepal” (hereafter, Digo Jal Bikas) project, led by the International Water Management Institute (IWMI), is to promote sustainable water resources development in Western Nepal through balancing economic growth, social justice and healthy, resilient ecosystems. The project contributes directly to IR2.3 of the USAID Nepal Country Development Cooperation Strategy (2014-18), focusing on means to increasing the resilience of targeted natural resources and consequently improving the livelihoods on which they depend.

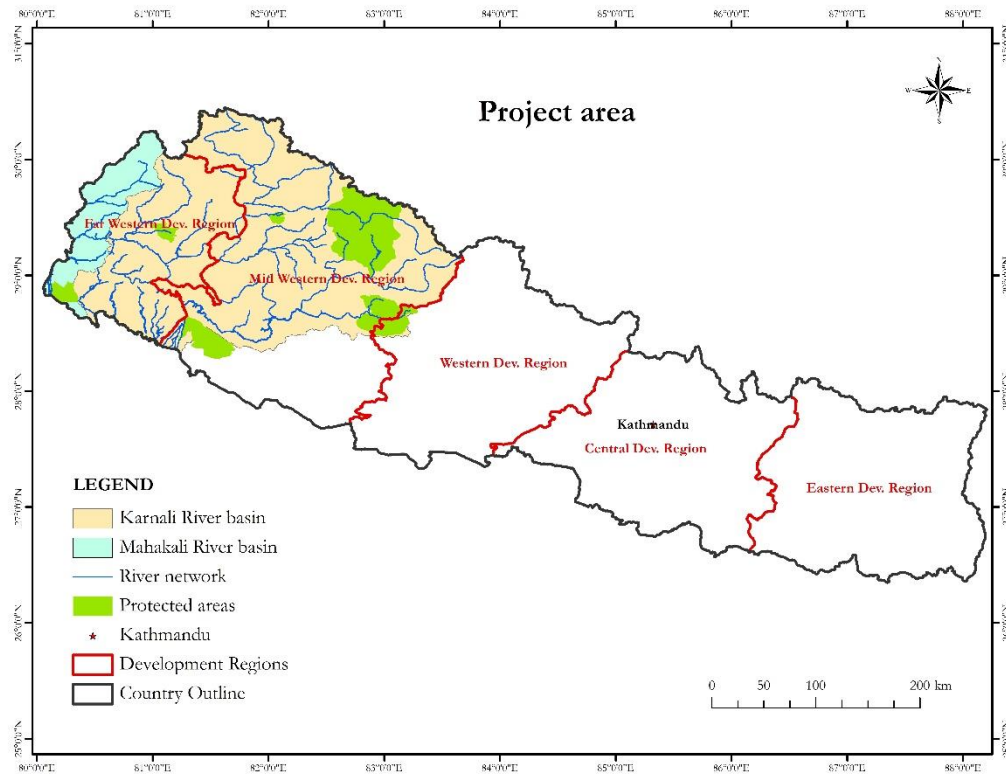
The geographic focus of this project will be the watershed basins and sub-basins within the Mid-western and Far-western Development Regions of Nepal, with a particular focus on the Karnali River Basin, including the Mahana sub-basin in the Terai, and the Mahakali River Basin (See Fig.1).

Three objectives are proposed to achieve this goal:

1. The construction of a sound knowledge base on the current state and use of ecosystems and their services and the impact of climate change as well as other drivers of future change in west Nepal to identify key information and knowledge gaps. This includes a comprehensive database on the study area’s natural characteristics including the river and lake network and their connectivity, groundwater aquifers, wetlands, biodiversity and protected areas, their ecosystem services, as well

as all water-related physical infrastructure and modifications. This objective will help establish key knowledge and information gaps and provide key datasets that will be useable for future and diverse analyses and planning purposes.

**Figure 1. The study region - Karnali and Mahakali river basins.
The Mehana sub-basin is part of the Karnali River Basin.**



2. The development and application of tools, models and approaches (including opportunities and risks) for sustainable water resources development under current state and future scenarios at the basin and local community scale. In particular, tools will be developed to identify the water flows necessary to maintain the integrity of ecosystems and their services. This information will then be used for hydro-economical modelling at basin scale to explore water allocation under future scenarios, including climate scenarios, of different water resources development options and the resulting trade-offs. At sub-basin, watershed and local community scales approaches for improved water management and water governance will be explored.
3. Support the development Integrated policy and management guidelines on options and technologies for sustainable water-infrastructure development will be developed for government and local communities. These guidelines will be designed to promote best practice in water-related infrastructure development (e.g. hydropower, irrigation, managed aquifer recharge, water storage) at different scales, which supports local communities and protects the resilience of ecosystems and their services. The aforementioned knowledge base, tools, models and approaches will underpin these guidelines, which will be developed with input from government and community stakeholders,

as well as donors and investors. The policy and practice guidelines will be formulated in collaboration with the PANI program.

To address the project objectives, and guided by the above research questions, six core Work Packages (WP) and two supporting WPs have been developed.

Table 1. Work packages.

| Core work packages | |
|---------------------------------|--|
| WP1 | Basin characterization |
| WP2 | Environmental flow assessment and tool development |
| WP3 | Basin-scale development scenarios |
| WP4 | Watershed/village water governance and management |
| WP5 | Gender |
| WP6 | Integrated policy and practice guidelines |
| Supporting work packages | |
| WP7 | Knowledge management and dissemination |
| WP8 | Project management |

The following stakeholders are envisioned as important groups to engage with during this project. They represent both next and end users of the project's products, tools and knowledge.

- Public and private sector agencies and multilateral investors who evaluate, design and implement water resources development projects and investment programs
- National and district level water and energy management agencies e.g. Ministry/Department of irrigation, Ministry/Department of agriculture, dam/barrage operation agencies, Ministry of Energy, Ministry of Forests and Soil Conservation, Water and Energy Commission Secretariat and the Department of Soil Conservation and Watershed Management Ministry of Science Technology and Environment (MOSTE), Ministry of Federal Affairs and Local Development and Department of Local Infrastructure Development and Agricultural Roads (DOLIDAR), Department of Water Induced Disasters and Prevention (DWIDP), DDCs and VDCs.
- Conservation groups that want to establish environmentally sustainable water resources planning and management.
- Women and men in farmer and fisher communities that will be affected by climate change and water management decisions in the basin.

1.2 Summary of Results for Selected Performance Indicators

The baselines for the key result indicators will be established by the end of the first quarter of calendar year 2017. The key indicators, sources of data and indicative targets are listed below (drawn from the M&E plan).

| Code | Selected indicators | How baseline will be established and data sources | Indicative Target over project lifetime |
|------|---------------------|---|---|
|------|---------------------|---|---|

| | | | |
|----|---|---|--|
| A1 | Changes in Ecosystems Health | UN-SC SEEA Experimental Environmental-Economic Accounting drawing on National statistics (Nepal Central Bureau of Statistics) baseline from Compendium of Environmental Statistics (2015). | Positive change in ecosystems health the measure of effective IWR development |
| A2 | Basin Plans developed by the Government of Nepal address the balance of growth, social justice and healthy, resilient ecosystems | IWMI Addresses and Reviews content of basin development plans | Evidence of integration of growth, social justice and healthy, resilient ecosystems |
| B | Status of Integrated Water Resource Management (IWRM) Implementation | <i>SDG Indicator</i> . Bi-Annual questionnaires measuring quantitative and qualitative dimensions. GoN adopts SDGs and reports annually as obligated under UN convention / agreements. Baseline to be established in 2017 | No unitary target. Evidence of improvement in IWRM implementation through detailed analysis and report from 2017 baseline, 2019 and 2021 |
| C | Changes in ecosystems knowledge and practice by key stakeholders | Knowledge, Attitude, Practice (KAP) Survey – to be adapted to the context and target groups. Will draw on Areas of Change (AoC) analysis. Baselines to be set in 2017 | Targets to be determined through KAP/AoC process including milestones towards improvements in KAP. |
| D | EFs integrated into water resource planning and development | | |
| E | Governments and other key stakeholders demonstrate knowledge of model strengths and limitations and capacity to apply and interpret models to assess trade-offs at local and basin levels | | |
| G | Number of stakeholders with increased capacity to adapt to the impacts of climate change as a result of USG assistance. | | |
| H | Evidence of gender and equity targeting in key policies, plans and implementation strategies | | |
| I | Number of institutions with improved capacity to address climate change (and more broadly IWRM) issues as a result of USG assistance | | |
| F | Relevance and effectiveness of pilots to local needs | Baselines of treatment and control / comparison groups for pilots in 2016/17 | Definition of success / targets based on degrees of expected change in utilization of technologies / success of the institutional pilot |

Progress indicators at the output level have been defined and outlined in the project's logical framework (see Annex 1 to this report). The status of these indicators is reported in the next section of this report.

2. ACTIVITY IMPLEMENTATION PROGRESS

2.1 Progress Narrative

Considerable time during the first six months of the project was spent on project set up activities which included:

- a. Assembling WP leaders and researchers to form the internal IWMI team
- b. Completing the annual work plan, GESI and M&E plans
- c. Recruitment of 1 national researcher/project coordinator (Post PhD), 1 post doc. (aquatic ecologist) and 2 research officers for research support
- d. Finalization of sub-contracts with Duke University and Kathmandu University.

Individual WPs have also started the planned activities for year one and the project is on track as far as work plan/targets in terms of overall project progress for the current reporting period. The various WPs have listed their data needs and have begun collecting and archiving both bio-physical and socio-economic data (temporal and spatial). An internal data sharing and management platform has been established where the project team can upload and share data. The various WPs have also refined and finalized their strategies for analysis. Specific package by package progress is as follows:

- WP 1, the SWAT model (<http://swat.tamu.edu/>) has been selected to model the climate and hydrology of the study basins. The model InVEST (<http://www.naturalcapitalproject.org/invest/>) has been selected for mapping and valuing ecosystem services.
- WP2 has finalized their strategy to combine IWMI's Environmental Flows calculator with the Biotic index tool.
- WP3 has finalized the hydro-economic modeling framework as well as a plan to assess basin development trajectories at basin and local levels.
- WP4 has selected their study sites based on relevant bio-physical, logistical and social criteria. Section 2.2. has additional details. Furthermore, project promotional material such as a project brochure and a website have been developed and launched (<http://swrfwn.iwmi.org/>).

The project team has also started reaching out to key partners and collaborators such as the Department of Irrigation, Water and Energy Commission, National Planning Commission Ministry of Women, Children and Social Welfare at the national level, and district level agencies such as District Soil Conservation Offices and the Rural Village Water Resources Management Project (RVWRMP) in Dadeldhura.

2.3 Implementation Status

Work Package 1. Basin Characterization

Intermediate Result: A sound knowledge base on the current state and use of ecosystems and their services in West Nepal evidentially used by relevant parties

| | | |
|-------------------------------------|-------|---|
| Output | 1.1 | Basin level database on freshwater ecosystems in W. Nepal, including climate forecasts and water flows, and water availability |
| Indicator | 1.1.1 | Database developed and functional |
| Semi-Annual Progress | 1.1.1 | Spatial and temporal data is being collected and prepared to set up the SWAT model e.g. 30 m resolution DEM, land cover map, soils map, meteorological and hydrological data etc. The collected data is being uploaded in the project share point |
| Implementation challenges | | The activities have been slow due to lack of personnel. A hydrologist has been hired and will start on Nov. 15, 2016. The activities are expected to speed up after this. |
| Stakeholder involvement in delivery | | Key stakeholders from the Water Energy Commission Secretariat have been informed. |

**Indicator 1.2.2 - Number and type of users of database – will become active once the database has been established and is online*

| | | |
|-------------------------------------|-------|--|
| Output | 1.2 | Report on Comprehensive assessment of the water governance decision-making structure and processes |
| Indicator | 1.2.1 | Report comprised of systematic policy clusters and institutional analysis |
| Semi-Annual Progress | 1.2.1 | The overall research design and research methodology for policy review and institutional analysis is completed. First round of policy documents (including laws, legal regulations, as well as development master plan prepared by various international agencies and donors) collection has been done. Collected policy documents are clustered into different themes (irrigation, environment, general, land, energy, among others) and time series (to analyze the process of policy evolution, as in the case of some of the policy that has been amended, renewed, reformulated). Key relevant actors and institutions including government, NGOs, national universities, local communities have been identified. |
| Implementation challenges | | No challenges encountered at this stage. |
| Stakeholder involvement in delivery | | Key policy actors and relevant stakeholders have been approached while collecting the policy documents and institutional background papers, but the key informant interviews and in-depth, semi-structured interviews with other relevant actors will be conducted in early 2017, after finalization of the first round of preliminary policy review and institutional analysis. |

**Indicator 1.1.2 - Identification of potential entry points for policy and institutional change – will become active once this work stream begins*

| | | |
|----------------------|-------|---|
| Output | 1.3 | Report with policy recommendations for improved basin governance based on political economy analysis, governance and institutional reviews focusing on the intersection of land-water-energy-environment, and incorporating gender issues |
| Indicator | 1.3.1 | Report prepared / Inclusiveness of policy recommendations |
| Semi-Annual Progress | 1.3.1 | Not available at this stage. Activity under 1.3 will start only after activities under 1.2 (e.g. key informant analysis, stakeholders interviews, focus group discussions) is completed (Feb-May 2017). Activity under 1.3 will include identification of key agents for change but this will be done only when the perception studies start in March-May 2017. |

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| Implement- ation challenges | | Not applicable at this stage. |
| Stakeholder involvement in delivery | | Key policy actors and relevant stakeholders have been approached while collecting the policy documents and institutional background papers, but the key informant interviews and in-depth, semi-structured interviews with other relevant actors will be conducted in early 2017, after the first round of preliminary policy review and institutional analysis have been finalized |

**Indicator 1.3.2 – Effectiveness of policy recommendations – will be reviewed once the report has been prepared (1.3.1)*

Work Package 2. Environmental Flow Assessment and Tool Development

Intermediate Result: Environmental flow allocations are integral part of river management practice informing future water resource planning and development

| | | |
|---|------------|---|
| Output | 2.1 | Desktop tool to calculate environmental flows (EF) and biotic index tool in Nepal |
| Indicator | 2.1.1 | Desktop tool functional and evidence of use |
| Semi-Annual Progress | 2.1.1 | Site selection manual is being prepared with criteria adopted in the selection of sites impaired by damming for water abstraction explained. Manual shall be finalized after receiving the comments from the participants at the Inception Meeting to be organized on 26th October 2016. Selection of river types considering WWF recommended World Freshwater Ecoregion and Forests Type, their relevance and accessibility has been discussed. Sampling methods incorporating size and frequency are finalized. A post doc researcher is employed and other manpower requirement is being worked out. First round of sampling shall be undertaken effective from the month of November 2016 to incorporate post monsoon samples. A review of all Environmental Flow methodologies is underway in order to facilitate the tool development as well as to produce a review paper. |
| Implement- ation challenges | | Challenge is in terms of availability of sampling gears in sampling large and deep rivers, and size of the samples which sometimes results into delay in reporting on time. Risk associated with the study is unpredictable flow conditions may result in insufficient time for colonization of the indicator species in large rivers. This however can be mitigated by considering large number of sampling sites from wadable streams. |
| Stakeholder involvement in delivery | | Kathmandu University is involved in delivering this output through the involvement of a Post Doc Researcher and an Intern. Additionally an expert shall be hired as Resource Person for short term period who will provide advisory role in site selection, sampling and application of invertebrate data base to e-flow calculator for its use in river management. |

**Indicator 2.1.2 – Biotic tool functional and evidence of use will become active once activity starts in this area.*

| | | |
|--|------------|--|
| Output | 2.2 | Recommendations for incorporating environmental water allocations into national water resources planning and on institutional arrangements for implementation |
| Indicator | 2.2.1 | Report with relevant recommendations |
| Indicator | 2.2.2 | Quality of recommendations |
| Semi-Annual Progress towards Output 2.2 (Sep 2016) | | Not available at this stage. Activity under 2.2 will begin later in the project cycle |

| | | |
|--------|------------|---|
| Output | 2.3 | Capacity built on environmental water management for key national stakeholders in Nepal, including curriculum development with a targeted university |
|--------|------------|---|

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|----------------------|-------|--|
| Indicator | 2.3.1 | Number of stakeholders with increased capacity to adapt to the impacts of climate change as a result of USG assistance. (USAID GCC Indicator 4.8.2-26) |
| Indicator | 2.3.2 | Quality of capacity built |
| Semi-Annual Progress | | Not available at this stage. Activity under 2.3 will begin later in the project cycle |

Work Package 3. Basin scale development scenarios

Intermediate Result: Increased and improved knowledge of tradeoffs in water resource development opportunities resulting from the application of hydro-economic models

| | | |
|-------------------------------------|------------|---|
| Output | 3.1 | Database and user interface for Government and Partners in the form of a water information system |
| Indicator | 3.1.1 | Database and user interface is developed |
| Semi-Annual Progress | 3.1.1 | The process of developing computer code for the river basin planning model using the General Algebraic Modeling System (GAMS) has been initiated. The drafts of the core program and water and agriculture modules are done and work has started on the development of the energy module. The industrial and environmental modules will be developed once the energy component is complete. A working draft of a template for data requests for input parameters to the river basin planning model has been developed. A schematic of the Karnali river basin indicating the locations that correspond to the data requests in the draft template are being finalized. These sites will be river and reservoir points, planned and existing hydropower and irrigation systems, industrialized areas, and protected areas. |
| Implementation challenges | | No particular challenges during the first six-month period. |
| Stakeholder involvement in delivery | | No information at this stage. |

**Indicator 3.1.2 – Relevance and quality of interface – will only be assessed once the interface has been developed*

| | | |
|-------------------------------------|------------|--|
| Output | 3.2 | Hydrology and infrastructure scenario analyses for predicting economic impacts (including distributional) on sectors and households |
| Indicator | 3.2.1 | Scenario analysis report prepared |
| Semi-Annual Progress | 3.2.2 | A review of existing literature focused specifically on water resources and environmental services in Western Nepal is being prepared. |
| Implementation challenges | | No particular challenges during the first six-month period. |
| Stakeholder involvement in delivery | | No information at this stage. |

**Indicator 3.2.2 – Quality and veracity of scenarios – will only be assessed once the scenarios have been outlined*

| | | |
|----------------------|------------|---|
| Output | 3.3 | Description of development pathway opportunities, and resulting trade-offs to key stakeholders |
| Indicator | 3.3.1 | Options paper prepared |
| Semi-Annual Progress | 3.3.1 | Communications with other work packages to develop stakeholder lists for soliciting input representing different basin interests (at both local and national levels) is underway. |

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| Implement- ation challenges | | No particular challenges during the first six-month period. |
| Stakeholder involvement in delivery | | Interactions with stakeholders to assess willingness to collaborate and priority interests has started |

**Indicator 3.3.2 – Quality and veracity of options – will only be assessed once the options have been outlined*

Work Package 4. Watershed / village water governance and management

Intermediate Result: Local communities in the project study area adopt practical technologies and land/water management approaches that improve water productivity, protect ecosystems and achieve more equitable water governance, which enable them to cope with and adapt to future climatic and socioeconomic pressures.

| | | |
|---|------------|--|
| Output | 4.1 | Assessment of sustainable water use under current and future conditions at local scale |
| Indicator | 4.1.1 | Report on the biophysical, social and cultural challenges to water access within the study sites |
| Semi-Annual Progress | 4.1.1 | An analysis of secondary data for the region is underway, primarily to support the site selection process, which is the next stage. Already two potential sites in the hills have been targeted for further data collection following a shortlist of 5. These sites will be visited for initial data collection from 19th-22nd October in hills, and some potential Tarai sites will be visited in early November. Once this is complete a more detailed biophysical and social baseline analysis can proceed. There were some delays in completing this task due to the monsoon, and delays in hiring the research officer for the project, |
| Implement- ation challenges | | The primary challenge is that during the data collection process, not all participants who we will collect data from will be 'beneficiaries' in the pilot interventions. Managing possible false expectations will be a priority, and we will need to make it clear to them that this is a research project with long term goals for the community and region, and only limited scope for immediate benefits. |
| Stakeholder involvement in delivery | | We have begun shortlisting local and national NGOs to participate in data collection and the later pilot interventions. Initial district level meetings will be held in the October field visits, and follow ups with potential partners will be made in Kathmandu later in the month |

**Indicator 4.1.2 – Relevance and quality of report findings – will only be assessed once the report has been prepared*

| | | |
|-------------------------|------------|--|
| Output | 4.2 | Recommendations for relevant local and national government agencies to enhance coordinated water resource management planning at the district and village level |
| Indicator | 4.2.1 | Report with relevant recommendations |
| Indicator | 4.2.2 | Quality of recommendations |
| Semi-Annual Progress | | Not available at this stage. Activity under 4.2 will begin later in the project cycle |

| | | |
|-------------------------|------------|--|
| Output | 4.3 | Feasibility analyses of local level pilots: new efficient pumping technologies; farmer cooperatives who jointly invest in irrigation equipment; drip and sprinkler systems to reduce water use per season |
| Indicator | 4.3.1 | Effectiveness of pilots |
| Semi-Annual Progress | | Not available at this stage. Activity under 4.3 will begin later in the project cycle |

Work Package 5. Gender

Intermediate Result: Greater awareness and capacity of key stakeholders in the water sector to consider and address unequal capabilities to benefit from and influence water resources planning and management across gender, caste, class and ethnicity at local and basin levels.

| | | |
|-------------------------------------|-------|---|
| Output | 5.1 | An analytical framework to analyze and integrate gender across scales in the water sector |
| Indicator | 5.1.1 | Analytical framework produced |
| Semi-Annual Progress | 5.1.1 | A senior research officer was recruited and will start in December 2016. The WP leader has also reviewed the literature on gender mainstreaming initiatives in the irrigation sector and in the hydropower sector in general. |
| Implementation challenges | | It was a challenge to identify suitable candidates for the national researcher position on gender and ultimately had to transform the position into a senior research officer position. |
| Stakeholder involvement in delivery | | Not applicable in this case. |

**Indicator 5.1.2 – Relevance and quality of framework – will only be assessed once the framework has been prepared*

| | | |
|-------------------------------------|-------|--|
| Output | 5.2 | Other WP consider inequalities by gender, caste, ethnicity and class in roles, responsibilities, impacts and trade-offs for women and men in water access and water resource planning and development processes |
| Indicator | 5.2.1 | Number of project outputs with clear gender analysis |
| Semi-Annual Progress | | Key policy documents in the water sector (Nepal's Water Resource Strategy, National Water Plan, Irrigation Policy) were reviewed to assess how they frame and address gender issues (contributes to WP1). |
| Implementation challenges | | None |
| Stakeholder involvement in delivery | | No further information. |

| | | |
|----------------------|-------|--|
| Output | 5.3 | Gender-specific recommendations for sustainable water resource development planning in Nepal under current and future conditions. |
| Indicator | 5.3.1 | Quality / relevance of recommendations |
| Semi-Annual Progress | | Not available at this stage. Activity under 5.3 will begin later in the project cycle |

Work Package 6. Integrated Policy and Practice Guidelines

Intermediate Result: Improve the knowledge base to develop integrated policy and management guidelines

Work on this result will begin in 2017.

2.4 Implementation challenges, Risks and Opportunities

The major challenge for the first half year has been in setting up the project team. The multiple recruitment process took time as the IWMI recruitment protocol had to be followed. As the project is an interdisciplinary project, expertise from various fields are required, so IWMI has set up a team of international experts also located in IWMI's other country offices. Coordination and management has sometimes been a challenge. In order to facilitate project coordination and communication, monthly meetings have been organized since June, 2016. All project staff are expected to participate either in person or through skype. The project team has also decided to meet in Nepal twice a year.

2.5 M&E Update

The following narrative outlines the progress made in designing and setting up the m&e tools and systems during the first six months of the project.

The theory of change (Annex 2) and logical framework (Annex 1) provide the goal, purpose, outcomes and outputs to be achieved under the project. They also provide the initial assumptions that are key to the theory of change of the project. Monitoring will take place through two interrelated processes: (i) formal assessment of progress against indicators and milestones on a semiannual basis under individual work package plans through an online tracker which has been developed and is now live ([here](#)), and (ii) an action-driven approach based on changes to outcomes measured through a combination of knowledge, attitude and practice (KAP) and Areas of Change (AoC) approaches (see Box 1 for further information).

Box 1. Areas of Change analysis (AoC)

AoC is an approach based on outcome mapping developed by the BRACED Programme (Building Resilience and Adaptation to Climate Extremes and Disasters, ITAD, 2015) It outlines a core set of processes or causal pathways that link project outputs to outcomes and ultimately to impacts on human well-being. Areas of Change are defined as:

- Changes in knowledge and attitude in relation to the objective of the component, in order to further strengthen policies and practices as appropriate
- Changes in the capacities and skills of national and local government, civil society and private sector to adapt and adopt to the interventions proposed
- Changes in the quality of partnerships to deliver interventions.
- Changes in decision-making processes through inclusive participation, as one key aspect of a resilient and sustainable system.

IWMI is currently applying the AoC approach in several other projects in the region – so lessons from these will be drawn and applied in this project. ¹ <http://www.braced.org/resources/li/?id=761757df-7b3f-4cc0-9598-a684c40df788>

Outcome mapping

Baselines will be conducted in late 2016 / early 2017 against the key indicators, with surveys repeated annually or bi-annually as appropriate to update the information and evidence of changes in outcomes. The timing of the surveys will be based on established impact trajectories (after Woolcock, 2009¹). It is noted that for projects that have social development components, such as those trying to increase participation, change behavior and practice, social theory prescribes that that shape of such project's functional form is more of a J-curve (that is things get better before they get worse), or a step function (that is, long periods of stasis followed by a sudden rupture brought on by a 'tipping point' in the adoption of a new technology in which prevailing norms and/or uptake by an influential individual (or, say,

¹ Woolcock, M., 2009, Toward a plurality of methods in project evaluation: a contextualised approach to understanding impact trajectories and efficacy, Journal of Development Effectiveness, Vol 1., No. 1, March 2009, pp.1-14. Routledge.

convincing a powerful government official) rapidly leads others to do likewise. Hence, once baselines have been established for the key indicators, impact trajectories will be mapped and follow-up studies timed accordingly to expected changes on the path.

Output Milestone tracking

A simple section of the [online tracking system](#) will request information on progress against milestones from work package leaders. The project management team, led by the M&E adviser, have designed the system, and worked with the project work package leaders to establish a streamlined template. Evidence from the output and outcome tracking (alongside information on evidence behind the assumptions), the gender tracker, risk assessments (including special event audit), and other related projects and components under the activities will feed into a learning and reflection process built into our planning and reporting. This will allow the project to refine its work and also increase the alignment and provide evidence to USAID and other stakeholders to facilitate overall understanding of the theory of change. The overall approach to monitoring and evaluation of this project will, therefore, rest strongly on regular and flexible feedback from stakeholders, and an accumulative learning-based approach.

Roles and Responsibilities

Under the project management unit, the project coordinator, who will work full-time on this project, will allocate 25% of her/his time to monitoring, evaluation and learning (MEL). The coordinator will be supported by two researchers who will each allocated 25-50% of their time to MEL activities. Each of the WP leaders will allocate 10-15% of their time to MEL related activities, including data collection, analysis, reporting, results-based management, follow-up and learning. The IWMI MEL specialist will establish the systems, train the project management unit staff, and back-stop the project, providing technical inputs on a needs basis, and quality assurance of specific products, including impact evaluations.

3. INTEGRATION OF CROSSCUTTING ISSUES AND USAID FORWARD PRIORITIES

3.1 Policy and Governance Support

At this initial stage, the project team is reaching out and working closely with various government agencies such as WECS, MOI etc. to identify their policy and governance needs and provide additional support if applicable. Furthermore, key policy documents in the water sector (Nepal's Water Resource Strategy, National Water Plan, Irrigation Policy) are being reviewed to assess how they frame and address gender issues in the context of water security.

3.2 Local Capacity Development

Masters students will be involved in policy review and institutional analysis as part of capacity building at this stage. One Masters student will also be involved in setting up the SWAT model for the study basin. At a later stage when the tools and models are set up, capacity development can be targeted towards various key stakeholders across scales (e.g. VDC, particular department within national ministries) to apply the tools such as the environmental flows calculator, the hydrological models, hydro-economic model. A few seminars will also be given at Universities.

4. STAKEHOLDER PARTICIPATION AND INVOLVEMENT

The project team has started reaching out to government organizations and NGOs at both national and district level, academia, other donors, etc. The objective at this stage is to make sure that relevant stakeholders are aware of our project and to involve them and get their feedback on our planned activities. Dialogue and intensive involvement of stakeholders will increase as we move forward. Details are listed in section 2.2.

5. MANAGEMENT AND ADMINISTRATIVE ISSUES

As the project staff are spread across various countries, efforts have been made to strengthen the team permanently based in Nepal. Therefore, four Nepali research staff have been hired i.e. One project coordinator and hydrologist (Post PhD), one aquatic biologist (Post PhD), two research officers (with gender and social sciences expertise).

A shared data portal has been set up for internal use. A project website has been launched. An online monitoring and tracking system has been designed and launched. The project team also has regular monthly meetings where personnel not based in Nepal join through skype. Furthermore, it has been decided that the project team will try and meet twice a year in Kathmandu.

6. LESSON LEARNED

During the internal project monthly meetings, the team decided that it would be more efficient and effective to link several activities falling under the different WPs. Therefore, data gathering efforts as well as stakeholder workshops will be planned jointly.

Discussions are also ongoing with the PANI team to collaborate more closely. Several areas of collaboration were brought up during the Water Partners meeting, which are being followed up e.g. selection criteria for study sites, sharing of data and analysis methods etc.

A GESI action has also been developed which outlines the linkages with all WPs and defines a set of indicators for each WP to measure progress.

PLANNED ACTIVITIES FOR NEXT SEMESTER INCLUDING UPCOMING EVENTS

The following tables provide the plans for the period October 2016 to March 2017, by work package and intermediate result.

Work Package 1. Basin Characterization

Intermediate Result: A sound knowledge base on the current state and use of ecosystems and their services in West Nepal evidentially used by relevant parties

| | | |
|--------------------|-------|---|
| Output | 1.1 | Basin level database on freshwater ecosystems in W. Nepal, including climate forecasts and water flows, and water availability |
| Indicator | 1.1.1 | Database developed and functional |
| Planned milestones | 1.1.2 | Set up the distributed hydrological model SWAT (completed by Dec. 2017) Set up the InVEST model to map Ecosystem services (completed by Dec. 2017) |

| | | |
|--------------------|-------|---|
| Output | 1.2 | Report on Comprehensive assessment of the water governance decision-making structure and processes |
| Indicator | 1.2.1 | Report comprised of systematic policy clusters and institutional analysis |
| Planned milestones | 1.2.1 | Preliminary analysis of policy review and institutional set up will be started. Start first round of key informants and relevant stakeholders in-depth semi-structured interviews. Identification of institutional gap at national level, which will later be linked with specific institutional set up in Karnali basin. |

| | | |
|--------------------|-------|---|
| Output | 1.3 | Report with policy recommendations for improved basin governance based on political economy analysis, governance and institutional reviews focusing on the intersection of land-water-energy-environment, and incorporating gender issues |
| Indicator | 1.3.1 | Report prepared / Inclusiveness of policy recommendations |
| Planned milestones | 1.3.1 | Based on key informant analysis, in-depth semi-structured interviews, and focus group discussions conducted with various stakeholders across scales (national, sub-national, local) potential agents for change will be identified and approached. Discussion will take place to ensure they are on board in co-producing key research findings, to ensure their policy buy in later on. This activity may start in March 2017. |

Work Package 2. Environmental Flow Assessment and Tool Development

Intermediate Result: Environmental flow allocations are integral part of river management practice informing future water resource planning and development

| | | |
|--------------------|-------|---|
| Output | 2.1 | Desktop tool to calculate environmental flows (EF) and biotic index tool in Nepal |
| Indicator | 2.2.1 | Desktop tool functional and evidence of use |
| Planned milestones | 2.2.1 | Sampling and field work of reference and impacted sites will be done by trained manpower In total 17 sites from five category classes (4+4+3+3+3) will be considered per season in each sub-basin. Sampling will be done in two seasons (Nov-Dec and May-June) |

| | | |
|--|--|---|
| | | A site protocol will be used to record multiple parameters (Protocol being developed). The review paper on environmental flow methods shall be submitted to a suitable journal. |
|--|--|---|

Work Package 3. Basin scale development scenarios

Intermediate Result: Increased and improved knowledge of tradeoffs in water resource development opportunities resulting from the application of hydro-economic models

| | | |
|--------------------|------------|--|
| Output | 3.1 | Database and user interface for Government and Partners in the form of a water information system |
| Indicator | 3.1.1 | Database and user interface is developed |
| Planned milestones | 3.1.1 | Finalize data template, following inception and stakeholder meetings in October and continue to develop the computer model |

| | | |
|--------------------|------------|--|
| Output | 3.2 | Hydrology and infrastructure scenario analyses for predicting economic impacts (including distributional) on sectors and households |
| Indicator | 3.2.1 | Scenario analysis report prepared |
| Planned milestones | 3.2.1 | Continue to work on literature review to inform scenario development |

| | | |
|--------------------|------------|---|
| Output | 3.3 | Description of development pathway opportunities, and resulting trade-offs to key stakeholders |
| Indicator | 3.3.1 | Options paper prepared |
| Planned milestones | 3.3.1 | Establish relationships with stakeholders in inception meeting to begin process of informing scenario development |

Work Package 4. Watershed / village water governance and management

Intermediate Result: Local communities in the project study area adopt practical technologies and land/water management approaches that improve water productivity, protect ecosystems and achieve more equitable water governance, which enable them to cope with and adapt to future climatic and socioeconomic pressures.

| | | |
|--------------------|------------|--|
| Output | 4.1 | Assessment of sustainable water use under current and future conditions at local scale |
| Indicator | 4.1.1 | Report on the biophysical, social and cultural challenges to water access within the study sites |
| Planned milestones | 4.1.1 | The key milestone will be the completion of the site selection (end of Nov 2016) and the compilation of a socio-economic and biophysical survey (Mar 2017) |

Work Package 5. Gender

Intermediate Result: Greater awareness and capacity of key stakeholders in the water sector to consider and address unequal capabilities to benefit from and influence water resources planning and management across gender, caste, class and ethnicity at local and basin levels.

| | | |
|--------|------------|--|
| Output | 5.1 | An analytical framework to analyze and integrate gender across scales in the water sector |
|--------|------------|--|

| | | |
|--------------------|-------|--|
| Indicator | 5.1.1 | Analytical framework produced |
| Planned milestones | 5.1.1 | Analytical framework will be completed |

| | | |
|--------------------|-------|--|
| Output | 5.2 | Other WP consider inequalities by gender, caste, ethnicity and class in roles, responsibilities, impacts and trade-offs for women and men in water access and water resource planning and development processes |
| Indicator | 5.2.1 | Number of project outputs with clear gender analysis |
| Planned milestones | 5.2.1 | Review of other key national policy documents, such as the LAPA, NAPA and Nepal's Hydropower Policy. |

7. HOW IMPLEMENTING PARTNER HAS ADDRESSED A/COR COMMENTS FROM THE LAST SEMI-ANNUAL OR ANNUAL REPORT

This is the first semi-annual report.

8. FINANCIAL SUMMARY

Refer to Annex C

ANNEX A: LOGICAL FRAMEWORK

Hereafter, Annex A will provide summative (quantitative) progress against indicators.

| <i>Narrative Summary</i> | <i>Indicators</i> | <i>Means of Verification</i> | <i>Assumptions and further info</i> |
|---|--|--|---|
| Goal | <i>(source cited where external)</i> | | |
| Improved water resources development in Western Nepal through balancing economic growth, social justice and healthy, resilient ecosystems | <p>A1. Change in Ecosystems health</p> <p>A2. Basin Plans developed by the Government of Nepal address the balance of growth, social justice and healthy, resilient ecosystems</p> | <p>A1. UN-SC SEEA Experimental Environmental-Economic Accounting drawing on National statistics (Nepal Central Bureau of Statistics) baseline from Compendium of Environmental Statistics (2015). Positive change in ecosystems health the measure of effective IWR development</p> <p>A2. Review of Basin Development Plans</p> | <p>Assumption 1) periodic update of environmental statistics at regional level in Nepal by CBS. 2) application of SEEA framework in Nepal (referenced in 2015 Nepal environmental statistics compendium)</p> <p>Further info: time-lag between project implementation, uptake and application of research, and impact on the goal or WRD which will only be evident after project completion.</p> |
| Purpose | | | |
| Strengthen basin- and local-level (watershed) integrated planning of water resource management in Western Nepal | <p>B. Status of Integrated Water Resource Management (IWRM) Implementation (Source: SDG Indicator 6.5)</p> | <p>Bi-Annual questionnaires measuring quantitative and qualitative dimensions.</p> <p>Improvements in the status of IWRM implementation measure expected.</p> | <p>Assumption: GoN adopts SDGs and reports annually as obligated under UN convention / agreements</p> <p>Further information. The goal of water resource development matches SDG 6.5 measured in terms of IWRM implementation (which is defined as an SDG indicator) and measured through to</p> |

| <i>Narrative Summary</i> | <i>Indicators</i> | <i>Means of Verification</i> | <i>Assumptions and further info</i> |
|--|--|--|--|
| | | | responses to national or locally managed questionnaires. See PIRT sheet for further details |
| Outcomes | | | |
| 1. A sound knowledge base on the current state and use of ecosystems and their services in West Nepal evidentially used by relevant parties | C. Changes in ecosystems knowledge and practice by key stakeholders | Knowledge, Attitude, Practice (KAP surveys) pre-post intervention. | KAP assumes success in project implementation to change behaviours. Detailed political economy, institutional and governance assessments will have to guide entry points as to who is relevant and interested. |
| 2. Environmental flow allocations are integral part of river management practice informing future water resource planning and development | D. EFs integrated into water resource planning and development [evidence of changes in knowledge, capacity and application around EFs] | KAP surveys | Sufficient functionality is provided by tools/methods developed to base actual decisions on environmental flow allocation Willingness and interest of key local government and other stakeholders to use environmental flow assessment tools/methods developed by the project |
| 3. Increased and improved knowledge of tradeoffs in water resource development opportunities resulting from the application of hydro-economic models | E. Governments and other key stakeholders demonstrate knowledge of model strengths and limitations and capacity to apply and interpret models to assess trade-offs at local and basin levels | KAP surveys | Functionality and interpretability of models Clarity in presentation of trade-offs Willingness and interest of key local government and other stakeholders to use model tools. |

| <i>Narrative Summary</i> | <i>Indicators</i> | <i>Means of Verification</i> | <i>Assumptions and further info</i> |
|---|---|--|--|
| 4. Local communities in the project study area adopt practical technologies and land/water management approaches that improve water productivity, protect ecosystems and achieve more equitable water governance, which enable them to cope with and adapt to future climatic and socioeconomic pressures | F. Adoption levels of key technologies G. Number of stakeholders with increased capacity to adapt to the impacts of climate change as a result of USG assistance. (USAID GCC Indicator 4.8.2-26) | Rapid impact evaluations to show effectiveness of the pilots. Follow-up surveys to look at adoption (where pilots successful) KAP surveys (indicator G) | Impact evaluations feasible (with suitable controls). Willingness and interest of local communities to test out the technologies and approaches. Funding and opportunities to scale up if and where successful |
| 5. Greater awareness and capacity of key stakeholders in the water sector to consider and address unequal capabilities to benefit from and influence water resources planning and management across gender, caste, class and ethnicity at local and basin levels. | H. Evidence of gender and equity targeting in key policies, plans and implementation strategies | Gender and equity assessment in the KAP surveys | Beyond analytical work, empowerment and critical consciousness approaches required to implement policies and initiatives that positively recognize and benefit women and the historically disadvantaged. |
| 6. Improve the knowledge base to develop integrated policy and management guidelines | I. Number of institutions with improved capacity to address climate change (and more broadly IWRM) issues as a result of USG assistance. (USAID GCC Indicator 4.8.2-14) | KAP surveys | No additional assumptions |
| Key Outputs | | | |
| WPI. Basin Characterization | | | |
| I.1. Basin level database on freshwater ecosystems in W. Nepal, including | I.1.1 Database developed and functional | Administrative records | Data are available and accessible |

| <i>Narrative Summary</i> | <i>Indicators</i> | <i>Means of Verification</i> | <i>Assumptions and further info</i> |
|--|---|---|---|
| climate forecasts and water flows, and water availability | 1.1.2 Number and type of users of database | Pages per month visited by IP addresses within the basin / number of different documents accessed per month | Existing data are relevant and sufficient Results are used in VDC planning Note Further information: we need baseline survey for water use and developing inventory of water sources |
| 1.2. Report on Comprehensive assessment of the water governance decision-making structure and processes | 1.2.1 Report comprised of systematic policy clusters and institutional analysis 1.2.2 Identification of potential entry points for policy and institutional change | Administrative records and interview with key stakeholders Interviews with key stakeholders and stakeholders consultation across scales (national-local) | Institutional set-up is existing across scales |
| 1.3. Report with policy recommendations for improved basin governance based on political economy analysis, governance and institutional reviews focusing on the intersection of land-water-energy-environment, and incorporating gender issues | 1.3.1 Report prepared / Inclusiveness of policy recommendations 1.3.2 Effectiveness of policy recommendations | Administrative records and interview with key stakeholders Interviews with key stakeholders and stakeholders consultation across scales (national-local) | Policy recommendations can resolve political/institutional deadlocks and gaps Policy actors are forthcoming |
| WP2. Environmental Flow Tools | | | |
| 2.1. Desktop tool to calculate environmental flows (EF) and biotic index tool in Nepal | 2.1.1 Desktop tool functional and evidence of use | Administrative records | Relevant stakeholders are open to learning about EF methodologies |

| <i>Narrative Summary</i> | <i>Indicators</i> | <i>Means of Verification</i> | <i>Assumptions and further info</i> |
|--|---|---|---|
| | 2.1.2 Biotic index tool functional evidence of use | Relevant stakeholders are familiar to the EF calculator and the biotic index tool | Relevant stakeholders have the capacity to apply the tools |
| 2.2. Recommendations for incorporating environmental water allocations into national water resources planning and on institutional arrangements for implementation | 2.2.1 Report with relevant recommendations 2.2.2. Awareness of the recommendations | Administrative records Awareness of the recommendations | Relevant stakeholders are open to the recommendations |
| 2.3. Capacity built on environmental water management for key national stakeholders in Nepal, including curriculum development with a targeted university | 2.3.1. Number of stakeholders with increased capacity to understand EF tools 2.3.2 Quality of capacity built | Administrative records Applications of tools among Uni. students Interviews with key users / stakeholders | University procedures allow to incorporate new techniques eg. EF tools Universities identify capacity building on EF as a need |
| WP3. Basin Scale Development Scenarios | | | |
| 3.1. Database and user interface for Government and Partners in the form of a water information system | 3.1.1. Database and user interface is developed 3.1.2 Relevance and quality of interface | Administrative records - Existence of interface / Track use of water information system by our stakeholders Number of stakeholders involved / Interviews with key users/stakeholders | The data exists and is accessible through stakeholder interactions Stakeholder interest in water information system Notes: For data we cannot get through stakeholder interactions, data is available via global databases or can be based on previous studies |

| <i>Narrative Summary</i> | <i>Indicators</i> | <i>Means of Verification</i> | <i>Assumptions and further info</i> |
|--|--|--|--|
| 3.2. Hydrology and infrastructure scenario analysis for predicting economic impacts (including distributional) on sectors and households in an options database. | 3.2.1 Options database developed 3.2.2 Scenario analysis report prepared 3.2.3 Options paper prepared 3.2.4 Quality/veracity of scenarios | Administrative records - existence of options database, report, and options paper Interviews with key users/stakeholders Track use of options database by our stakeholders | Development plans exist that include an understanding of costs and benefits Stakeholder interest in scenario analysis that can help to determine priorities |
| 3.3 Development of hydro-economic models to explore resource development options. | 3.3.1 Models developed 3.3.2 Relevance and quality of models | Administrative records - existence and functionality of models Interviews with key users/stakeholders | Data available as needed for models |
| 3.4. Analysis of development pathway opportunities and resulting tradeoffs to key stakeholders through a decision support tool. | 3.4.1 Decision support tool developed 3.4.2 Tradeoff analysis report prepared 3.4.3 Quality/veracity of options | Administrative records- Existence of decision support tool and analysis report Interviews with key users/stakeholders Track use of decision support tool by our stakeholders | Data availability Enough support from stakeholders |

| <i>Narrative Summary</i> | <i>Indicators</i> | <i>Means of Verification</i> | <i>Assumptions and further info</i> |
|---|--|---|---|
| WP4. Community Scale Water Management and Governance | | | |
| 4.1 Assessment of sustainable water use under current and future conditions at local scale | 4.1.1 Report on the biophysical, social and cultural challenges to water access within the study sites | Administrative records Field measurements | Local government has an idea of water budget in different seasons Communities are willing to set-up system (if does not exist) |
| | 4.1.2 Quality / relevance of report findings | Interviews with key users/ stakeholders | Government and Donor partners are willing to allocate resources for capacity building |
| 4.2 Recommendations for relevant local and national government agencies to enhance coordinated water resource management planning at the district and village level | 4.2.1 Report on recommendations | Administrative records | Local planning at Ward Citizen Forum (WCF) level will use the data for five years planning and also use our recommendations |
| | 4.2.2 Quality / relevance of recommendations | Interviews with key users/ stakeholders | |
| 4.3 Feasibility analyses of local level pilots: new efficient pumping technologies; farmer cooperatives who jointly invest in irrigation equipment; drip and sprinkler systems to reduce water use per season | 4.3.1 Effectiveness of pilots | Impact Assessment for different types of households | Communities are willing to cooperate We can manage “elite-capture” |
| WP5. Gender | | | |
| 5.1 An analytical framework to analyze and integrate gender across scales in the water sector | 5.1.1 Analytical framework produced | Administrative records | - |
| 5.2. Other WVP consider inequalities by gender, caste, ethnicity and class in roles, responsibilities, impacts and trade-offs for women and men in water access and water resource planning and development processes | 5.2.1. Number of project outputs with clear gender analysis | Administrative records | - Sex-disaggregated data are available - Project team is willing to include gender in their research |

| <i>Narrative Summary</i> | <i>Indicators</i> | <i>Means of Verification</i> | <i>Assumptions and further info</i> |
|--|---|--|--|
| 5.3 Gender-specific recommendations for sustainable water resource development planning in Nepal under current and future conditions. | 5.3.1 Quality / relevance of recommendations | Interview with key users / stakeholders | - Gender is an important issue to consider in Water Resources Development and Planning |
| WP6. Integrated Policy and Planning Guidelines | | | |
| 6.1 Publically available website hosted by a government department and database consisting of datasets and maps, e-flow calculator, analysis reports, and other outputs from each of the work packages | 6.1.1 Website online and being used | Online tracker / pages per month visited by IP address etc | - |
| 6.2 Presentation of scientific information in popular forms for targeted dissemination: community-based materials, videos, training materials, sourcebooks. | 6.2.1 Number of different forms of popular presentation of scientific information | Administrative records | - |

ANNEX B: THEORY OF CHANGE

The theory of change for this project outlines the logical relationships, deliverables, expectations and assumptions to address the problem of inadequate approaches to maximize the potential for water resource management in Western Nepal without undermining the environmental features on which it relies. It focuses strongly on the understanding of, and responding to, the demands (actual and latent) for information, and in shaping approaches that tackle and seek to influence attitudes and behaviors through better access to, and use of, the evidence provided. The long-term impact trajectory of the project is based on the application of knowledge products, trainings and workshop facilitation on water management and governance, and ultimately environmental flows. This requires a critical mass of factors (including new information, seizing of opportunities based on good political economy analysis, and regular interaction with key individuals) to reach a tipping point that is not likely to take place within the three-year time frame of the project. Therefore, to address evidence of progress and change, proxy measures and the testing of assumptions will be critical.

The ToC draws, inter alia, on Kingdon's (2010)² work on the 'streams' that seek to improve the chances of scientific and social evidence impacting on policy and practice. Kingdon identified three streams:

- Problems: the way conditions are framed as undesired or problematic;
- Policies: the solutions generated to address problems, constrained by technical feasibility, compatibility with prevailing values, etc.
- Politics: political factors, e.g. the power/influence of interest groups, other urgencies and burning issues, elections.

The agenda-setting theory proposes that policy issues are more likely to be addressed by policymakers when at least two of the above streams converge to create a policy opportunity or window. For example, the removal of technical constraints to a solution coupled with the election of a champion. Evidence-Based policies addressing improvements in natural resource management practices are typically put in place when at least two of the following conditions are met: a) the lack of access to vital resources, e.g. water (or the undermining of the natural resource base) is unanimously framed as undesired and problematic; b) the solutions proposed in terms of policy options are feasible and acceptable from a socio-cultural viewpoint; and c) the political context is favourable to the adoption of these solutions.

Figure 1. (below) outlines the specific pathways in the case of the DIGO JAL BIKAS project. The critical problem is that the current approaches to water resource management and future planning do not adequately consider the required balance of productivity, environmental and equity issues and the potential impacts of climate change. To improve water resource development in Western Nepal (**the goal**), this problem has to be solved. The theory of the project posits that that problem can be separated into two inter-related streams of issues –

² Kingdon, J. (2010). *Agendas, Alternatives, and Public Policies*. Pearson.

technical information and evidence gaps around basin-level tools to assess resource availability and use, the lack of quantification of environmental water requirements and flows and the failure to date to address different development trajectories. The theory of change is that if a series of specific initiatives (**work packages**) are put in place to address each of these technical challenges, some at local level, some at basin scale – and are then applied by communities and local authorities – then water resource management will improve. However, technical solutions are not sufficient alone, and the assumptions implied in the technical track of the theory are substantial. Hence the theory is that the technical stream will be supported by a stream of work to address specific governance and management challenges around the decision-making of water resource utilization, socio-cultural inequities around access and control and scale relationships between basins and communities. It is posited that detailed analysis on institutional and governance issues, cooperative pilots, water resource management planning capacity development and science-based scenario planning – when carried out in conjunction with the technical track – will address the assumptions around the uptake and application of the techniques and practices proposed.

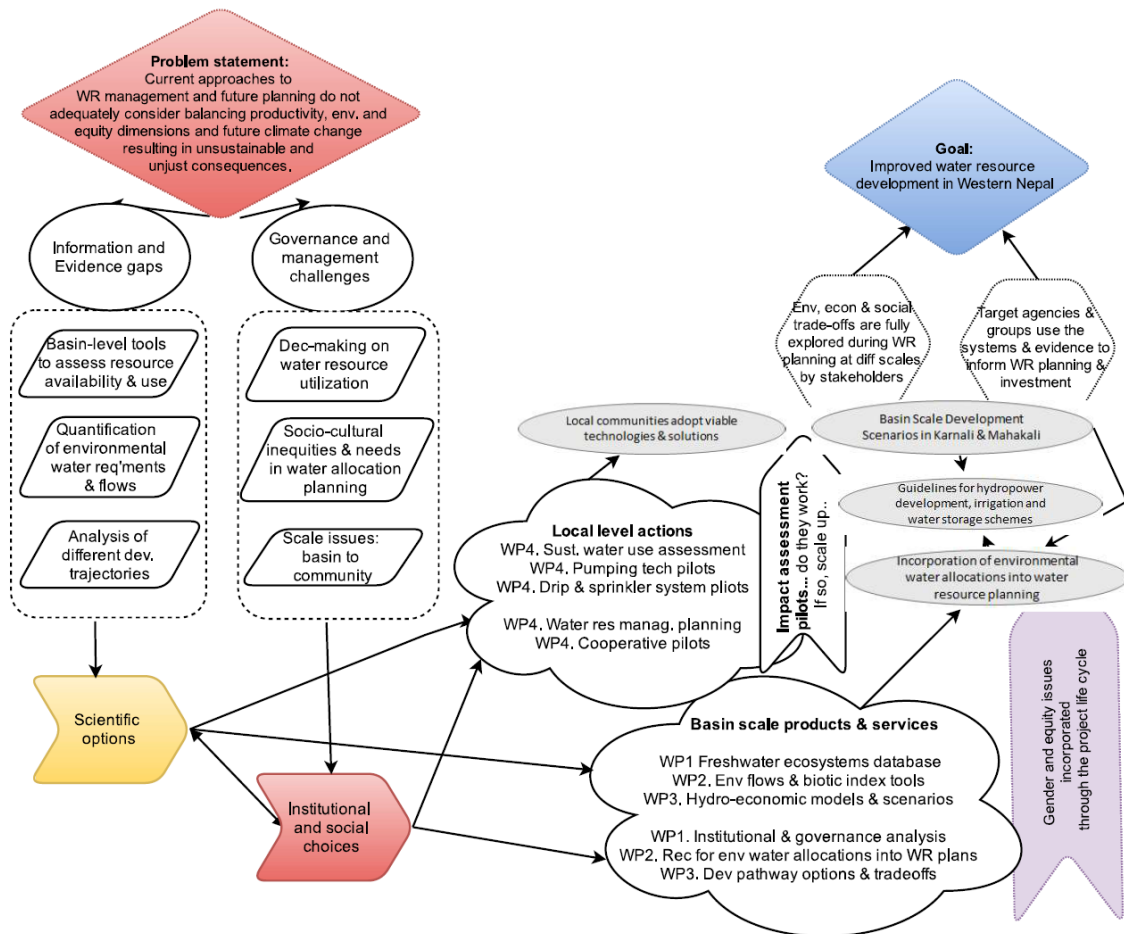


Figure 1. “Digo Jal Bikas” - Theory of Change

Supporting this argument is that work on basin characterization in Western Nepal is the first stream that seeks to directly address information and evidence gaps in bio-physical, social-economic and political interplays of the whole Karnali basin – and has never previously been

carried out. There is interest in developing hydropower and irrigation in the basin but there are also biodiversity hotspots and tourism interest. No one has so far looked at different development trajectories for the basin and tradeoffs between the multiple water use sectors in the Karnali and Mahakali at both the full basin level and smaller sub-basin levels. There is demand from the government, development banks, aid agencies etc. for this kind of information.

Alongside this, analysis of environmental flows is a concept that is in its infancy in Nepal. Development agencies including the World Bank, IFC, USAID are trying to build capacity but so far, it has not been included in any policies to date. The project will build further capacity in Nepal to conduct e-flows assessments and also develop a tool which can be used by practitioners to conduct e-flows assessments, which alongside biotic index tools and the basin characterization will enable the exploration of environmental, economic and social trade-offs of various options.

At the community level, a series of trials will be carried out on technical and social options to improve water resource access and management, including drip and sprinkler systems, pumping technologies and cooperative purchasing agreements. Rigorous impact assessments will provide evidence of what works, what doesn't and why as the basis for guiding what can be scaled up by local communities with external support as and where required.

In all cases, detailed gender and equity analysis will be carried out to ensure that there is a good understanding of who controls, benefits and loses in any set of arrangements, again to guide decisions on future investments. In combination, these initiatives, supporting and feeding into related larger programs like PANI, will seek to improve water resource development allocative decisions in Western Nepal.

For the goal of improved water resource development in Western Nepal to be realized, the trade-offs have to be fully and properly explored, characterized and understood by those responsible for decisions, and target agencies and groups have to use the information and approaches proposed. If these assumptions hold (which will be constantly reviewed and monitored) then the project expects to impact on the goal.

ANNEX C: FINANCIAL SUMMARY