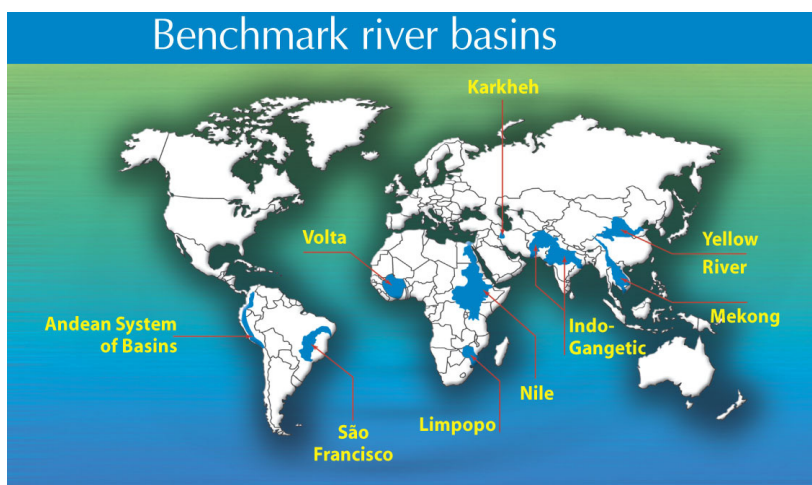


RAPID BASIN ASSESSMENT: Understanding the issues and formulating a response

Basin Focal Project Working Paper No. 4



**WORKING WITH PARTNERS TO ENHANCE
AGRICULTURAL WATER PRODUCTIVITY SUSTAINABLY
IN BENCHMARK RIVER BASINS**



DISCLAIMER

This is an advance edition of *Rapid Basin Assessment: Understanding the issues and formulating a response* and is a **draft version** of a working paper to be published formally by the Challenge Program on Water and Food. This report contains less than fully polished material. Some of the works may not be properly referenced. The purpose is to disseminate the findings quickly so as to invigorate debate.

The findings, interpretations, and conclusions expressed here are those of the author(s) and do not necessarily reflect the views of the Challenge Program. Comments and additional inputs that could contribute to improving the quality of this work are highly welcomed.

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RAPID BASIN ASSESSMENT:

Understanding the issues and formulating a response

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1 Introduction

The goal of the Challenge Program on Water and Food (CPWF) is to “improve the productivity of water in river basins in ways that are pro-poor, gender equitable and environmentally sustainable” (CPWF 2007). A subsidiary goal is to alleviate poverty through improved agricultural water management.

Many river basins in developing countries are experiencing water challenges – declining dry season river flows and groundwater mining, inequitable access to water resources, water quality deterioration, degradation of aquatic ecosystems and low water productivity. These challenges impose additional constraints on achieving the noble Millennium Development Goals of reducing hunger and poverty, particularly in areas where the major limitation to increased agricultural production is water availability.

Most problems in the management of natural resources such as water and soil are people based and cannot be understood without knowing the behaviour and motives of the people who generate the problems. The purpose of rapid basin assessment (RBA) is to establish an analytical process that includes all important

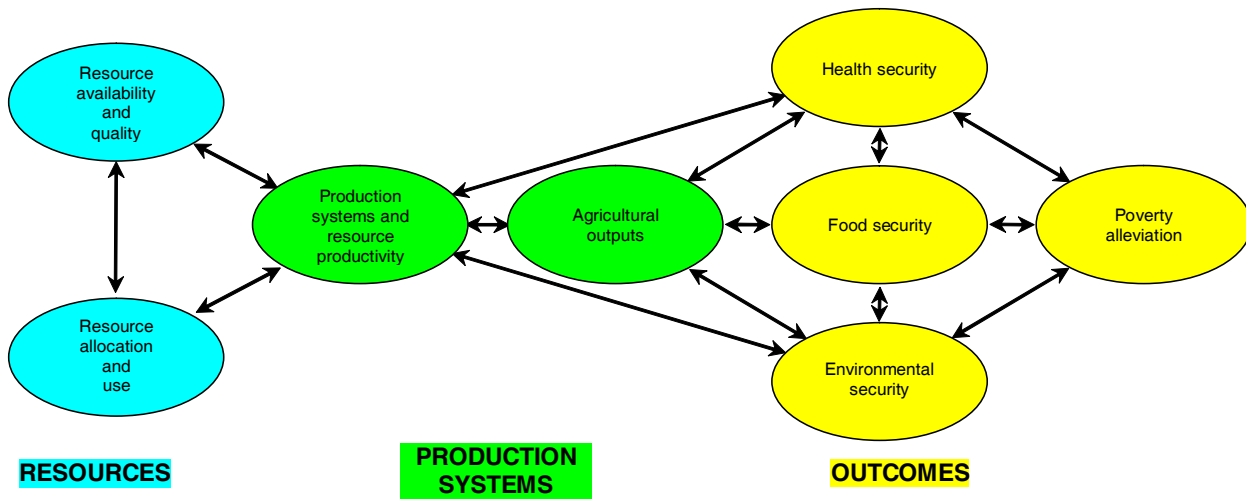


Figure 1. Relationship between the categories of attributes relevant to poverty alleviation and their components.

attributes that are relevant to poverty alleviation as related to water (Figure 1). The attributes are grouped into three categories, resources, production systems and outcomes.

Primarily RBA establishes an inventory of:

- What are the resources;
- How these resources are used; and
- What is the status of the security of health, food and the environment.

Based on this inventory, RBA then seeks to establish:

- What the shortcomings are; and
- What indications are there of problems and how might those problems be resolved.

RBA is therefore a rapid appraisal process, which involves review of the appropriate literature, acquisition of data, and basin reconnaissance, including stakeholders and institutions, followed by preliminary analysis of the identified issues and information needs and gaps.

RBA is the first stage in the development of a full basin assessment. It is intended to:

- Provide a general description of the bio-physical and socio-economic conditions in different parts of the basin;
- Identify and describe the nature and extent of natural resources, agricultural production, water productivity, food security and poverty issues in different parts of the basin;
- Identify and describe the key stakeholders and institutions;
- Describe the pattern of processes relevant to the river basin and interactions between ecosystem components;
- Identify externalities, their causes, sources and effects;
- Prioritize issues for detailed analysis; and
- Develop a plan-of-action for detailed analysis and dissemination of study findings.

While RBA provides less detail and analysis than a full-blown study, it offers the following benefits:

- Quick and inexpensive approach for setting priorities and taking action;

- Providing a level of detail that is sufficient for identifying actions that could be implemented immediately; and
- Identifying where further detailed analyses are needed.

This document explores issues associated with RBA, specifically how rapid assessments can be carried out to serve as a basis for detailed analysis that would guide future planning of interventions aimed at enhancing water productivity in ways that alleviate poverty and enhance food, health and environmental security. Section 2 presents the assessment stages and principles that guide the assessment. Section 3 discusses the key issues and the components of the assessment. Section 4 presents the assessment process and outputs. The diagnostic tools that might be used in the RBA are included in the Appendices. Where relevant, we provide examples from an unpublished RBA in the Karkheh basin in Iran in 2005.

2 Assessment stages and guiding principles

2.1 The stages

We conceptualize RBA as a three to six months' set of activities that can be grouped into seven stages (Table 1). Implementation of these stages should be guided by the following principles of good assessment process (Hallhead *et al.* 2001). The assessment should be:

- Simple in its concept, but capturing the salient features;
- Transparent in its assumptions, methodology and data;

Table 1. Stages in Rapid Basin Assessment

Stage	Purpose and activities
1. Initiation of the study	Agreement on the terms of reference, specifically: What will be done, how and where, what the outputs will be, and with what professional inputs, time frame and budget.
2. Team formation and bonding	Agreements on the team composition and duties and responsibilities of each member of the team.
3. Gather existing data and information	Creation of an inventory of available data and information and acquire readily accessible reports and data sets.
4. Analysis of existing data and information	Assessment of what are the major issues, how they vary spatially and temporally, what are the causes, how are they addressed and what are the data and information gaps.
5. Plan basin reconnaissance	Technical planning - Acquire data and carry out preliminary assessments to identify key issues to be explored during the reconnaissance. – Remote sensing information, rainfall, soils, agro-ecological zones, land use and poverty maps Logistic planning – Establish contacts with the people to see and agree on places to visit, route and any pre-visit consultations with stakeholders
6. Carry out basin reconnaissance	Data collection and information gathering – administer questionnaires and carry out focused group discussions, key informants discussions, field observations and any measurements deemed necessary Preliminary data analysis and consultations with basin stakeholders to validate preliminary findings and secure agreements on priorities
7. Plan follow up activities	Synthesis and dissemination

- Systematic, holistic and integrative to ensure that all relevant issues are considered; and
- Participatory to ensure that different voices are heard and considered.

2.2 Guiding principles

2.2.1 GOAL OF THE ASSESSMENT

The main goal of the assessment is to assess the broad condition of agricultural water management in the target basin and in so doing engage local stakeholders (policy makers, planners, researchers, extension officers, resource managers and users, etc.) who have detailed knowledge of conditions on the ground. In this way local stakeholders become active participants in the process and bring to the assessment their perceptions of how resources should be managed to improve water productivity and contribute to poverty alleviation. Getting authorities and basin stakeholders to recognize and accept this is the first steps towards:

- Getting people to play a positive active role in addressing the priorities they have helped to identify;
- Bringing all interested people together to share a diversity of ideas;
- Building trust and rapport through being open and responsive to ideas;
- Encouraging flexibility and diversity in shared working and decision-making;
- Ensuring clarity about responsibilities and reporting progress; and
- Building experience and confidence in shared planning and problem solving (Hallhead *et al.* 2001).

Guiding principles for securing ownership include:

- Purpose driven and relevant;
- Inclusive not exclusive;
- Flexible and self-regulating;
- Equal opportunity;
- Involving diverse interests;
- Accountable, time efficient; and
- Commitment to implementation.

2.2.2 STAKEHOLDERS' PARTICIPATION

A basin has many stakeholders with diverse objectives, views and pursuing different livelihood strategies. They experience different pressures depending on the biophysical, socio-economic and institutional context in which they operate. They cause different problems, are affected by different problems and have different attitudes to these problems. Planning interventions should therefore take this diversity into consideration.

Stakeholder participation is a pre-requisite to successful interventions. From the assessment perspective, this calls for optimal stakeholder participation – participatory rapid basin assessment. Participatory assessment differs from traditional assessment where assessment findings are viewed as the end result of the process. In contrast, participatory assessment views assessments as a means to enhancing human capacity to achieve positive change in human and ecological wellbeing. Stakeholders' participation is therefore needed to ensure: a) that the assessments focus on the issues that are urgent and important to them; and b) that issues are addressed in a holistic manner. Stakeholder participation raises additional challenges, such as who should participate, how and when. It can therefore involve difficult negotiations, which can slow down the assessment process.

Participation has been taken to mean different things by different people at different times and in different circumstances. This has caused confusion on what participation is and difficulties in control of the quality of the participation processes and the resulting output. The level of participation varies from informing, seeking information, consultation, deciding together and to acting together. The level of participation adopted at various stages in the assessment will vary depending on the assessment's purpose the timeframe and the availability of financial resources. The main goal will be to achieve the level of participation that is acceptable to all parties taking into consideration the limitations (financial, time, language, communication, scope, etc).

RBAs should therefore be participatory and to achieve effective participation they should be guided by the principles developed for achieving a balance between traditional and participatory research in natural resource management (Ashby *et al.* 2000, Ashby 2003, Vernooy and McDougall 2003). They include:

- Identify and represent different stakeholder interests;
- Build a capacity for innovation by including stakeholders in joint enquiry and co-development of new resource management regimes;
- Combine different kinds of knowledge and expertise through participatory learning and joint enquiry;
- Employ facilitation, negotiation and conflict resolution to define research priorities and practice as well as resource management;
- Monitor and evaluate participation and the research process according to agreed codes of conduct and standards of research practice; and.
- Make power sharing a conscious assessment strategy.

2.2.3 PRO-POOR APPROACH

For the assessments to be fully aligned with the Millennium Development Goals, it is necessary that due attention is given to poverty issues. This is mainly due to the urgency to address the plight of the poor who are often most adversely affected by the problem and most dependent on agriculture, water and natural resources for cheap food, employment opportunities and incomes. In some cases they may be contributors to specific problems and in these cases their behavioural changes may make a difference. Hence, the need to identify pro-poor opportunities in following areas:

- Increasing the production of foods that are highly valued by the poor;
- Increasing output, productivity and profitability of smallholder agricultural enterprises;
- Reducing risks associated with: rainfall (uncertain on-set and cessation of rainfall, dry spells, soil erosion); changes in water quantity, quality and timing by upstream water and land users; and prices of commodities that the poor consume in large quantities;
- Diversification of smallholder agricultural enterprises to enhance their resource use efficiency and spread/reduce the risks;
- Private sector investments that have high potential for increasing employment and incomes for the poor, particularly women and disadvantaged groups; and
- Interventions that empower the poor to take control of their own destiny by adopting strategies that improve their livelihoods.

3 What will be assessed?

3.1 Introduction

River Basin Assessment is essentially the same as rapid rural appraisal, sustainable development appraisal, rapid environmental assessment and other form of rapid assessments. The main differences are:

- The use of a basin to define the geographic boundaries of the system (Reid and Ziemer 1994);
- The purpose of the assessment, which is to identify the improvements required in the management of water and agricultural production systems so as concomitantly to achieve higher social, economic and environmental gains; and
- The focus on the interaction between water, the choices that people make and the resulting human and ecological wellbeing (Hallhead *et al.* 2001).

3.2 Key issues

At the basin level, the challenge can be stated as, “Can we increase water productivity in ways that achieve internationally-adopted targets for:

- Decreasing malnourishment and rural poverty by the year 2015;
- Meeting health and environmental security targets; and
- Reducing water use in agriculture in sub-basins and basins that are experiencing high levels of water scarcity?”

RBA of necessity relies heavily on information obtained from expert consultation and existing reports and data to provide answers to the following key questions:

- In which parts of the basin is agricultural growth constrained by water quantity, quality and timing? What proportion of surface and groundwater is used in agriculture and how has it changed over-time? How is that use distributed within the basin? What scope is there to increase water productivity in crop, livestock and fish production systems? Will increasing agricultural water productivity decrease water use in agriculture and increase water availability to other sectors and the environment?
- Is the basin experiencing or projected to experience food insecurity? If so, in which areas and how severe? To what extent can agriculture contribute to food security through increased water productivity, agricultural production, employment and earning of foreign exchange?
- What is the level of poverty in the basin? How is it distributed? To what extent can agriculture contribute to the alleviation of poverty and by what means (agrarian reform, diversification and/or increased water productivity)? What is the spatial relationship between poverty and water availability (rainfall, surface, groundwater, wastewater)? How is poverty contributing to any water crisis identified in the basin?
- In which ways and to what extent are agricultural activities contributing to improved health? How can this be enhanced?
- In which ways and to what extent are agricultural activities contributing to environmental degradation? How can agriculture contribute to enhancing environmental security? Will increasing agricultural water productivity enhance environmental security, if so how and where?

In the last two points above, time will not permit an in-depth analysis therefore RBA must rely heavily on expert consultation and existing summary reports such as those listed. In both cases, the information will need to be examined in the light of poverty alleviation. This will likely be a new emphasis.

To provide answers to these questions we focus on key issues and their interactions (see Figure 1) and in particular how are the interactions influenced by technical solutions, institutional setting and stakeholders actions. Quality and availability of resources determines the resources available for allocation among users and uses. Allocation for a particular use, quality of the resource and the agricultural production system influences the productivity of water, land, labor and capital resources. Resource productivity, amount of resources allocated and their quality influences agricultural production systems and the resulting agricultural outputs. Agricultural production system and output levels influence income (and contribute to poverty alleviation), food, health and environmental securities. Income, food, health and environmental securities have complementary and competitive linkages.

3.3 Components of the assessments

For each issue the assessment examines the past, the present and probable future:

- The current status and its determinants (where are we and why);
- Trends of key indicators of the status (how did we get here); and
- Desired future state (where do we want to be and how do we get there).

The issues fall into eight broad assessment categories that links resources, production systems and outcomes:

- (i) Resource availability – How much do we have and how does it vary spatially and temporally in quantity and quality:
 - Quality and availability of resource (quality and availability of natural capital, mainly land, water, grazing and fishery resources); and
 - Physical capital such as transportation, agro-industries, dams, irrigation systems; and human capital).
- (ii) Resource development, sharing and use:
 - Resource allocation and use (allocation of natural, physical and human resources to the agricultural sectors); and
 - Within the agricultural sector, allocation among competing uses and users in different parts of the basin.
- (iii) Agricultural production systems, their outputs and resource use and productivity:
 - Resource productivity (production system, their resource use and productivity of water, land, labor and capital) with emphasis on water productivity; and
 - Agricultural outputs (quantity, quality and seasonality of crop, tree, livestock and fisheries produce).
- (iv) Human wellbeing – To what extent are the human needs being met?
 - Alleviating poverty (income security): (income levels, inequality, agricultural incomes, employment creation and foreign exchange earnings);
 - Food security (food demand, consumption, malnutrition, import and export); and
 - Health security (effect of level of agricultural output on nutrition and health status, water-related diseases).

- (v) Ecological wellbeing – What is the status of the river and its watersheds in terms of sustainability in production of goods and services.
 - Environmental security (watershed and river health).
- (vi) Stakeholders actions – What stakeholders actions have cumulative effects that give rise to both positive and negative externalities?
- (vii) Technical aspects - What are the main technical solutions applied in different parts of the basin, how appropriate and/or effective are they and what is the scope for improving technical performance and sustainability of agricultural production systems?
- (viii) Institutional analysis – How are institutional arrangements influencing human behavior and how can they be made more effective?
 - Policies
 - Legal framework
 - Organizations

A judicious combination of literature reviews, questionnaire surveys, group discussions, field observations and measurements is required to gather data and generate information (see Appendix 1) needed to address the above issues.

4 The assessment process and outputs

In this section we present the process and the outputs of the seven stages of the rapid assessment process.

4.1 Commissioning of the study

This stage calls for a thorough review of the terms of reference and the proposal document that forms the basis of funding the assessment initiative. Of particular importance here is the re-examination of the stated objectives and outputs and the resources that will be mobilized to produce the outputs. It is essential that the scope of the study is clearly defined for both the client and the team carrying out the assessment.

4.2 Team formation and bonding

This stage is very critical to the success of the rapid assessment. It is particularly useful if the team composition has changed or if the team members have not worked together in the past. The main purpose of this stage is to reach agreements on the final composition of the team and the duties, responsibilities and budget for each team member.

Ideally, the assessment will require expertise in hydrology/water resources, economics, policy analysis, institutional analysis, social science, environment and natural resources, agricultural production systems (crop, tree, livestock and fish) and planning. In the absence of all these expertise in the final team a major challenge is how to share responsibilities based on experience and willingness of the team members to cross his/her professional boundaries. One way of addressing this challenge is to work with basin scientists who possess a variety of skills. Collaborating with basin scientists offers two opportunities: firstly, they can fill in the gap as identified from the list above and secondly, they bring in local experience and are able to access grey literature to which the team otherwise may not have access.

4.3 Gathering existing data and information

Data gathering involves creating an inventory and acquiring data and information (mainly publications) existing in the:

- Researchers' offices and computers and institutional libraries;

- Web, particularly the major web-data sites IDIS, FAO, CSI;
- Basin institutions – web-sites and libraries; and
- Grey literature – major consultant studies.

After the data and information have been acquired, an analysis of the data and information should be carried out to establish:

- Data and information quality (accuracy, precision and representativeness);
- Spatial coverage – locations with relevant data; and
- Temporal coverage – Are there sufficient data to carry out a time series analysis?

The major outputs of this stage are:

- Inventory/database of existing data and reports;
- Analysis of spatial and temporal data and information gaps sorted out by issue; and
- Strategies for filling data and information gaps (surveys, modeling and monitoring).

4.4 Analysis of existing data and information

The importance of analyzing the existing data and information as a basis for planning rapid assessment activities cannot be over-emphasized. The justification in carrying out extensive and comprehensive analysis of existing data and information gives the following benefits Leedy (1997):

- Provides insights of what is known about the area, problems and how other researchers handled methodological issues;
- Reveals sources of data that the team may not have known existed; and
- It can provide the team with new ideas and approaches that may help them evaluate their own assessment efforts by comparing them with the similar efforts of others.

Literature review of the topics and issues related to the outputs of different components will help the team identify where they should concentrate their efforts in collecting new data and generating information, which issues to focus on and which people and institutions to consult.

The outputs of this stage include:

- Documentation of the key issues and data and information gaps; and
- Documentation of issues that need to be followed up during the subsequent stages of the assessment.

4.5 Planning the basin diagnostic reconnaissance

The first step in planning the basin diagnostic reconnaissance is to clarify its objectives. These include:

- Identify the key stakeholders, their views and potential contribution in addressing issues related to enhancing water productivity at the basin level;
- Understand the nature and extent of poverty and potential for increasing water productivity in different parts of the basin;
- Establish the main past and on-going initiatives that the project might want to build on;
- Through a consultative process, develop a common vision on water productivity and poverty in different parts of the basin and a shared understanding on how these might be improved; and

- Obtain an overview of the hot spots, potential solutions, what has been tried, what works, under what conditions and why.

To be able to achieve the objectives of the reconnaissance, it is important to have a coherent list of activities and how they might be carried out. The list of activities could include:

- Conduct an initial brainstorming meeting with the team members to agree on objectives, members of the reconnaissance team and their duties and responsibilities, places to visit, people to contact and the reconnaissance schedule;
- Prepare a set of questions that will be addressed during the reconnaissance;
- Prepare a brief explanation of the Basin Focal Project concept: its purpose, objectives, outputs and expected outcomes and distribute this to key institutions in the basin, particularly the ones the team intends to visit or seek collaboration with;

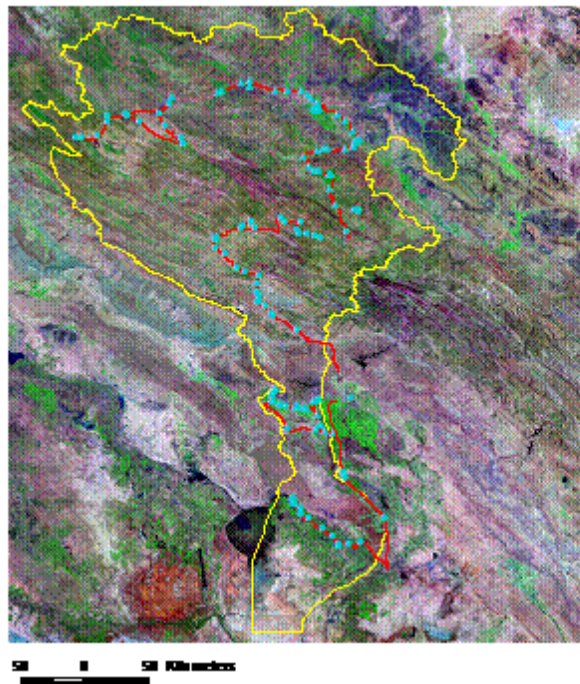


Figure 2. Map of the diagnostic reconnaissance of the Karkheh Basin. The red line indicates the route taken and the blue dots are the villages surveyed. From unpublished Karkheh 2005 RBA.

- Send the briefing notes to the key informants and seek their participation in the exercises. Where appropriate request them to provide a write up of their goals, objectives, past achievements and future activities;
- Analysis of existing maps (population density, poverty, land use/cover, rainfall, soils, geology, topography, hot and bright spots) – Google earth and IDIS basin kits provide a good basis for initiating this process;
- Prepare a tentative travel map showing the places to visit (see Figure 2) and the main issues to address at each site;

Box 1: Observations made during the Karkheh Basin diagnostic reconnaissance.

- Karkheh basin has a very well developed infrastructure. Roads, electricity and telephone facilities are available even in very remote areas.
- In general people appear to have good nutritional status – there are no obvious signs of malnutrition or abject poverty
- Soil erosion is a serious problem in the middle sections of the basin. This translates in serious reservoir sedimentation problem.
- Cropland generally appears to be well managed and yields are reasonably high.

- Finalize travel arrangements including confirmation of the appointments with the key informants that the team will visit; and
- Acquire the necessary tools and equipment – lap-tops, cameras (video and still), GPS, maps and reports.

The output of this stage is the detail plan of the basin diagnostic reconnaissance.

4.6 Basin diagnostic reconnaissance

The purpose of the diagnostic reconnaissance is to gather, in a participatory manner, the data and information required to complete the RBA. It builds upon the analysis of existing data and information carried out during the compilation of data and literature review (see Box 1).

4.7 Data collection procedures

4.7.1 NATIONAL AND SUB-NATIONAL LEVEL CONSULTATIONS

The team conducts national level consultations with relevant government officials to get a better understanding of the institutional context and the importance of the basin to the national economy and the level of national resources invested in the basin.

4.7.2 COMMUNITY LEVEL CONSULTATIONS

Community level meetings: Organised by the study team to discuss key issues and to create awareness among the population of the concerned villages relating to the goals of the study. The community feed back could be used to revise the visions, needs, potential and options. Such meetings are mostly held before the participatory village-level assessment, to prepare activities and designate which people will participate in the assessment.

Sample surveys/mapping: Community mapping of changes in natural resources, land use, and agricultural system performance.

Trend analyses: Consultations on the past, present and future. These data can be used for scenario analysis.

4.7.3 HOUSEHOLD/FARM SURVEYS

Interviews: Are open, semi-structured/guided, or structured interviews held with individuals, families, or actor groups.

4.8 Cross-cutting suggestions

The following guidelines for carrying out a successful diagnostic reconnaissance are recommended:

Box 2: Example of issues captured in a typical interview.

Mr. Martaza's household is located in the hilly areas of Garmasiab sub-basin of Karkheh basin comprises of 6 male and 5 female members. They own 12 ha of undulating land with slopes up to 6%. Winter rainfall is his only source of agricultural water as surface water is too far away and groundwater is too deep. Therefore he grows winter crops (wheat and chickpea) and seeks employment in urban centers during the summer. Family wage income is low because family members are uneducated and unskilled. Crop yields are low and highly influenced by rainfall variability. Average wheat and chickpea yields about 650 and 500 kg/ha, respectively. At about 0.2 kg/m³, crop water productivity is very low. For improved production, Martaza looks for the help in terms of provision of better seeds and fertilizer at lower cost. Better access to the farming machinery at household and village level is also in his wish list for improved productivity. However, Martaza is satisfied because his family has access to drinking water supplied by the government through a groundwater pump and piped system. Mr. Martaza was interviewed during the Karkheh 2005 RBA.

- Share the duties and responsibilities among the team members and take the opportunity to learn from others;
- Keep the key informants informed of any changes in schedule and any additional requests the team want to make;
- Leave sufficient time between stops to accommodate any unplanned activities that may allow the team to explore any issues that were not planned for;
- Be observant, open-minded and inquisitive. Where-ever possible make additional inquiries that may improve the team's insight;
- Take photographs and record their GPS positions;
- Develop appropriate questions for the key informants (see Appendix 1 for sample questions) and agree on how the team members will share the responsibility of asking these questions;
- Where possible meet the key informants at their place of work. Visit as many agricultural producers as possible so as to capture the diversity by meeting the young and the old, the rich and the poor, those close to the road and those with poor access, small and large scale;
- Identify innovative solutions and document them; and
- After every consultation with the key informants, hold team consultations to consolidate the learning and develop a shared understanding of the issues and potential interventions.

4.9 Planning follow up activities

The main purpose of this stage is to finalize and disseminate study findings (see Box 3). This involves:

- Follow up on any leads for collaboration, data sources and additional contacts;
- Finalize analysis of data and information;
- Synthesis of study findings;
- Finalize report; and
- Disseminate key messages to the key stakeholders.

Box 3: Examples of follow up activities.

The Karkheh basin diagnostic reconnaissance was carried out during the period 4-13 October, 2005. During the visit to Khuzistan Water and Power Authority (KWPA) various opportunities for collaboration were identified. These necessitated a follow up visit with the following objectives:

- To assess the available information (data and reports) on the water resources, environmental aspects, socio-economic and GIS related activities of KWPA;
- To meet the key people in the relevant disciplines; and
- To seek further agreements on partnership arrangements.

During the follow up visit detailed discussions on potential areas of collaboration, data availability and conditions for use, KWPA's contribution to the study were held. Some of the observations include:

- The working environment at KWPA offices is highly professional and much of it is composed of research studies on which most of their development activities (building of dams and irrigation and drainage networks, water allocation and distribution, hydropower development and dealing with wetlands and other environmental issues) are embarked upon.
- They have a good data and information base consisting of reports on water balance studies conducted in various regions of South Karkheh basin, good synthesis reports on wetlands in the Province, good data set on water inflows to wetlands, bio-diversity in the wetlands, sources of income and income from wetlands.
- Close cooperation with the technical department of KWPA was considered to be highly beneficial while working on Basin Focal Project in Karkheh Basin.

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APPENDICES

Appendix 1. Key questions to be addressed

Some of the key questions that need to be answered during the assessment are:

1. Poverty analysis:

- Is the basin experiencing or projected to experience food insecurity? If so, in which areas and at what level of severity? What are the anticipated changes and desired future conditions? What is the nature and extent of any health problems, particularly those associated with water problems? In which ways and to what extent are agricultural activities contributing to health problems in the basin? What are the anticipated changes and desired future conditions?
- What are the main characteristics of the poor? What is the level of poverty in the basin? How is it distributed? How is poverty contributing to the water crisis in the basin? What are the anticipated changes and desired future conditions?
- How do they earn their livelihoods? To what extent can agriculture contribute to poverty alleviation?
- What is the spatial relationship between poverty and water availability (rainfall, surface, groundwater, wastewater)? How does water management affect poverty status? What poverty reduction programs are on-going and how successful are they?

2. Analysis of water availability and access:

- What is the spatial and temporal variability in quantity and quality of surface and groundwater resources? What are the anticipated changes and desired future conditions?
- In which parts of the basin is water availability and access a major issue?
- Which are the water scarcity hot spots and what are the causes of water scarcity?
- What are the main water resource management issues?
- What data and information is available on water resources, their use and development?

3. Analysis of agricultural water productivity :

- **Resources and agricultural production systems:** What are the main agricultural production systems in the basin? What is the average land holding, cropland/capita, grazing land/capita, forest land, grazing land? What is the nature and extent of degraded lands? What are the anticipated changes and desired future conditions? Are there areas that have an infrastructural gap (water storage, transportation and marketing infrastructure, agricultural equipment)? What are the anticipated changes and desired future conditions? What is the population in different sub-basins and how does it influence the management of water and agricultural production system? What are the anticipated changes and the desired future conditions? How much water is used in agriculture in different parts of the basin? What are the anticipated changes and desired future conditions? How does the land quality and level of agricultural chemicals affect water use in agriculture? What are the anticipated changes and desired future conditions?

- **Environmental security:** What is the nature and extent of land and water degradation problems? In which ways and to what extent are agricultural activities contributing to environmental degradation? What are the anticipated changes and desired future conditions?
- **Assessing productivity:** What is the level of agricultural outputs in different parts of the basin (tons, value)? What is the average agricultural income per household and what are the main factors constraining the attainment of higher values? What are the anticipated changes and desired future conditions? How much water is used in different agricultural production systems, what yields are attained and what is the water productivity?

4. Institutional analysis:

- **Stakeholder analysis:** For each of the key problems who are the main stakeholders? What are the concerns of different stakeholders? What are the perception of different stakeholders on each key problem, on its cause and effects and how it should be addressed? What are the characteristics, strengths, weaknesses, opportunities and perceived threats of different stakeholder categories? What is the relationship between the different stakeholders and how is it contributing or hindering the attainment of food, water and environmental security? What strategic partnerships should be developed among different stakeholders? Which stakeholders should be represented in the basin consultation processes, in research activities, in dissemination and awareness raising, etc?
- **Policy analysis:** What are the main policies that affect agricultural production in different parts of the basin? What policy and institutional changes have taken place in the last ten years and how have these changes affected agricultural production and water productivity? What are the anticipated changes and desired future conditions? What are the potential for improvements?
- **Legal framework:** How effective is the legal framework in promoting sustainable agricultural production, water use and management? What are the potential for improvements? What are the anticipated changes and desired future conditions?
- **Organizational context:** Which are the main institutions involved in agriculture and water management? How effective are the different organizations operating at different scales in promoting sustainable agricultural production, water use and management? What are the potential for improvements? What are the anticipated changes and desired future conditions?

5. Intervention analysis:

- **Basin vision:** Based on what the stakeholders have identified as the major problems, what would be the basin/sub-basin visions?
- **Potential improvements:** What are the main factors limiting agricultural production in different parts of the basin? What are the potential for improvements? Which are the main agencies involved in promoting agriculture and water related interventions? What do basin stakeholders consider to be the most urgent interventions in the next 5 and 10 years? What water saving initiatives have been introduced in different parts of the basin? What do stakeholders consider to be their main knowledge gaps and what research do they consider worth funding?

6. Development and application of the knowledge base:

- What is the current status of information on water availability, use and productivity?
- How is this information currently used?

- What additional information will be required?
- What should be done to improve access to information?

Appendix 2. Diagnostic tools

In this section we present a sample of diagnostic tools that can be used in the rapid basin assessments.

A2.1 Participatory assessment tools

The rationale for participatory approaches lies in the fact that eliciting people's own analysis of their situations provides a deeper understanding of the issues, their causes and effects and of potential interventions that are acceptable to the stakeholders. In RBA, the aim is to ensure on-going participation by establishing contact with key stakeholder groups.

Participatory assessment is characterized by participation of community members, by giving them a voice and by ensuring that data collection and analysis is undertaken in an open and transparent manner to ensure that their views are fully integrated in planning, assessment and any interventions identified in the RBA.

In summary, the main participatory assessment approaches include:

- Rapid rural appraisal (RRA, McCracken et al. 1988¹): Flexible progressive learning, multi-disciplinary research teams, community participation, outsiders gain information from rural people in a timely and cost effective manner;
- Participatory rural appraisal (PRA, Chambers 1994²): Shift from extractive mode to empowering and facilitating active local participation in planning activities; and
- Participatory learning and action (PLA, Pretty et al. 1995³): More emphasis on mutual learning, attitudes and behavior of researchers, and taking action on the outcomes.

These approaches offer a structured learning process, with and from communities, about their own situation and conditions of life. It requires full involvement of local people as the main subjects and not objects of inquiry and mixes a variety of methods to fit the situation and to reach those people who are the most difficult to reach.

The main characteristics of these approaches include:

- Breaks down hierarchical barriers and offsets biases in dominant or outside paradigms thereby allowing the poor and disadvantaged groups to be heard;
- Allows the local people to carry out analysis of their own situations with the help of researchers;

¹ McCracken, A., Pretty, W. and Conway, G. R. (1988). An Introduction to Rapid Rural Appraisal for Agricultural Development. International Institute for Environment and Development: London.

² Chambers, R. (1994). Participatory rural appraisal (PRA): Analysis of experience. *World Development* **22**:1253-1268.

³ Pretty, J.N., Scoones, I.C., Guijt, I. and Thompson, J. (1995). A Trainer's Guide for Participatory Learning and Action. International Institute for Environment and Development: London. 267 pp.

- Accommodates different perspectives that are needed to get a holistic understanding of the opportunities, contradictions and differences that might exist;
- By using different participants and sources of data and information it makes it possible to validate observations and recommendations;
- Adaptability of the tools to specific contexts; and
- Empowers communities by getting them to identify what they can do now without outside help (pick low-hanging fruits).

A suite of tools is used for specific assessments, notably: village mapping, village transect, time-related tools, problem ranking, wealth ranking, resource and social maps (information on borders, farmland, livestock, houses, and infrastructure) and institutional analysis.

A2.2 Causal chain analysis

Causal chain analysis has been extensively used for scientific reason involving cause and effect relationships. Analysis follows a logical process of enquiry to elicit actual or potential causes that result in a given effect. The process is largely subjective, but logically consistent and transparent. When arranged according to their level of importance, analysis yields a relationships and hierarchy map of the causes and effects. They are particularly useful in: a) the search for root causes; b) identification of problem areas; and c) comparing the relative importance of different causes.

Figure A1 illustrates how causal chain analysis can be used to clarify problem areas during an RBA. It is clear from this example that care is necessary to ensure balance of analysis, since the result merely represents information according to pre-existing beliefs, that are not so much tested as organized in a transparent representation. Models can be tested subsequently by more detailed analysis.

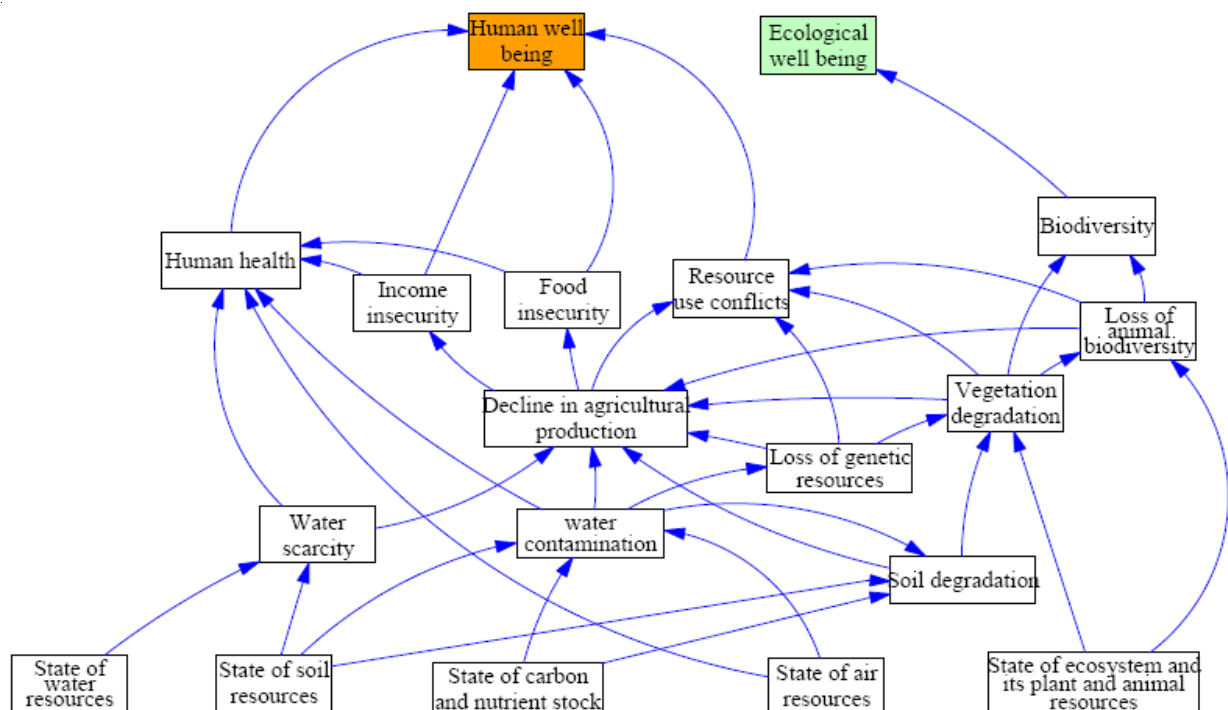


Figure A1. Relation between resource status, resource use and well being.

A2.3 Sustainable livelihoods framework

Sustainable livelihood framework is a tool for improving our understanding of how households manage their resources taking into consideration the factors that are within and without their control to secure livelihoods. The livelihood framework consists of five main components: the vulnerability context, livelihood assets, livelihood strategies, livelihood outcomes, and institutional context.

- *Vulnerability context* refers to unpredictable events that adversely affect livelihood outcomes by undermining the livelihood assets and/or strategies. They can be fast acting such as floods, fire, earthquake or slow acting such as natural resource degradation. They also differ in their spatial coverage ranging from civil strife that may affect one or more countries to floods that affects communities in flood prone areas to illness that may affect only one member of the household.
- *Livelihood assets* refer to the resource base that households and communities use to earn a livelihood. They include household (active labor, education, knowledge and skills); physical (tools, equipment, houses, roads); natural (land, grazing resources, fish, forest resources, water and biodiversity); financial (savings, jewelry, income); and social (group membership, kinship, social-political voice) capitals.
- *Livelihood strategies* comprise the combination of activities and choices that people make to secure a specific livelihood outcome. They include on-farm and off-farm activities.
- *Livelihood outcomes* are what the household members achieve when they deploy their livelihood assets and make their livelihood strategy choices. Livelihood outcomes include the levels of food security, net income, health, asset accumulation and social status – all which determine the level of human wellbeing achieved by the household.
- *Institutional context* consist of the policies, institutions and processes that influence livelihood strategies directly by: a). determining what is legal and appropriate for different genders; b) creating incentives to pursue certain livelihood strategies; and c) raising awareness and influencing perceptions of effectiveness of certain strategies.

These livelihood elements are all interlinked: vulnerability and institutional contexts affects asset-enhancing investments and hence the level of asset; livelihood assets are major determinants of livelihood strategies; and livelihood strategies determine the livelihood outcomes. Livelihood outcomes can determine consumption, reinvestments and the resilience to future vulnerability.

The use of sustainable livelihood framework in RBA facilitates a good understanding of what influences household decisions, the weak links that need to be reinforced by future interventions and the untapped potential that can play a key role in influencing change of behavior towards sustainable development.

A2.4 Driving force, pressure, state, impact and response framework

The driving force, pressure, state, impact and response (DPSIR) framework is organization information on the cause-effect relationship between various elements of the social, economic and environmental systems (Figure A2). It captures:

- The driving forces of change (e.g. population growth);
- Pressure on the ecosystem (e.g. over-depletion of water resources);
- The state of the ecosystem (e.g. shrinking wetlands);
- The impacts on human and ecological wellbeing (food insecurity); and

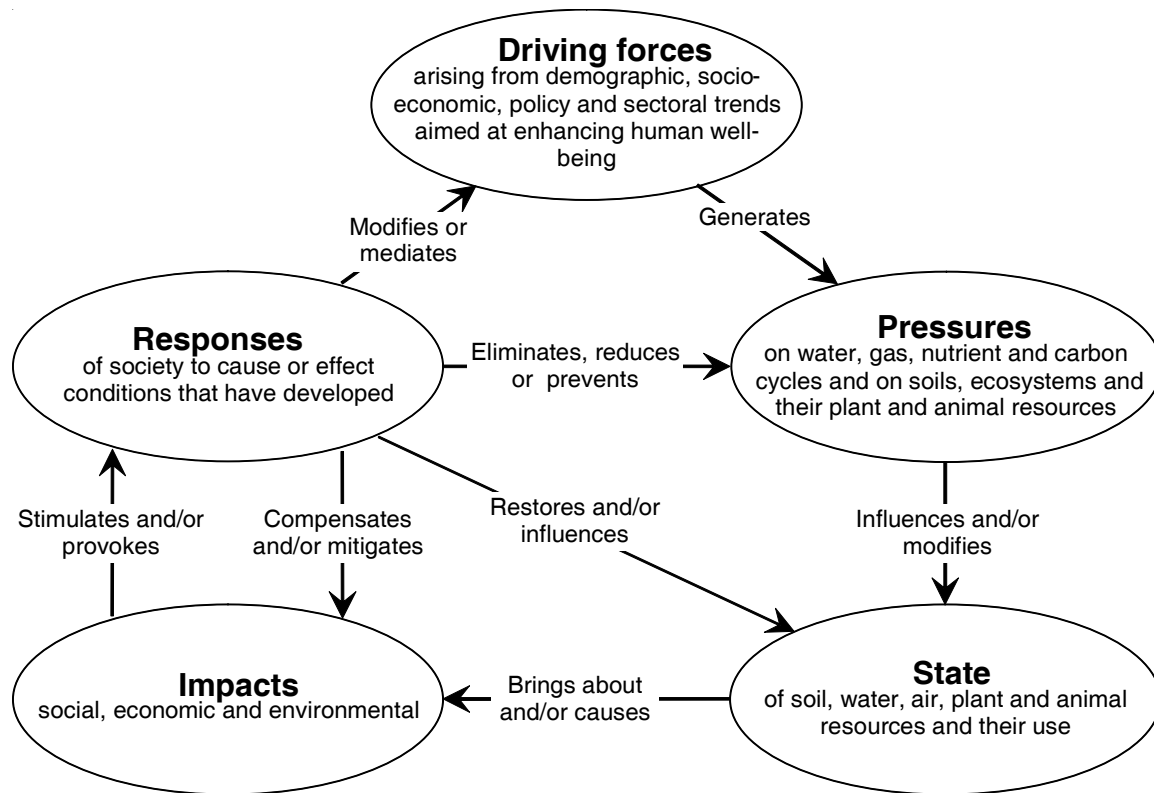


Figure A2 Driving force, pressure, state, impact and response (DPSIR) framework.

- The responses (what society is doing about the problem, e.g. incentives for improving water productivity).

It is, therefore, a logical and convenient way to structure the information as it makes the links visible and facilitate deeper investigations of the causes.

Appendix 3: Implementation challenges

Wide range of issues: Potent issues range from water quality problems on agricultural land, to water rights, to fishing rights, to a proposed dam, to loss of jobs, to threatened and endangered species, to declining stocks of river fisheries, to flood risk. In one way or another, all of these issues are interrelated. RBAs are expected to assess the relative importance of each as part of the assessment and address a subset of these issues depending on this assessment of their importance.

Interdisciplinary challenge: The problems should be evaluated from an interdisciplinary viewpoint so as to ensure that the solutions take into account the full range of on-site and off-site impacts that the solutions might have both now and in the future. Thus, interdisciplinary analysis should be a major component of RBA. This is based on the recognition that no discipline by itself can answer all the issues. Appropriate problem solving is possible only when each individual discipline plays a supporting role that facilitates a better assessment of the whole set of issues from different perspectives. Creating and sustaining an effective inter-disciplinary team is constrained by difficulties in communication between different disciplinary specialists associated with (a) differences in approach, knowledge base, and

vocabulary; (b) institutional barriers where different specialists come from different agencies; (c) cultural differences and (d) commitment to the issues being addressed.

The teamwork problem: Once an interdisciplinary team has been constituted the biggest challenge is that of ensuring that personality clashes within the team do not happen. Personality clashes may be attributed to (a) personality issues, (b) work load not equitably allocated, (c) the time each team member devotes to the analysis does not coincide with the schedule of other team members, (d) inadequate communication among members, (e) ill-defined team vision, (f) lack of a bold leader who ensures that the needs of the RBA are placed above those of individual team members and the institutions they represent.

Some of the factors that contribute to an effective team are: (a) enthusiastic team members who enjoy working on the issues and with one another; (b) good understanding of each others' disciplines and capabilities; (c) having a shared vision of the nature of their task; and (d) effective communication and transparency. Experience has shown that it takes time, experience, and dedication for new teams to become effective and hence the need to assemble the team carefully and foster its growth.

The interagency problem: There are several agencies working in a given river basin in most cases having over-lapping responsibilities on certain issues. These agencies were founded for different purposes, may have different mandates and goals and may operate in different jurisdictions and be governed by different laws. What they may have in common is the desire to improve social, economic and environmental status of the area under their jurisdiction.

Inter-agency collaboration is key to the successful implementation on projects with multiple goals such as those on improving water productivity in ways that alleviate poverty and enhance health, food and environmental security. We envisage the involvement of the following agencies: research and extension; water resources management; irrigation management; environmental management; agricultural development; regional planning and development; public administration; energy development; and social services and health agencies. Their level of participation needs to be carefully evaluated based on the role they play in resolution of given issues in a particular location. The participation of these agencies is dependent on their perceived benefits from the analysis. Participation of key agencies must be aggressively pursued through all forms of communication: written, telephonic calls and informal briefings. The basin assessment may also serve a useful role in facilitating interagency cooperation. This assessment could provide the forum for personnel of various agencies to share ideas and experiences and to identify opportunities for collaboration beyond the life of Basin Focal Projects.

The complexity problem: The scale that must be considered during the evaluation and the level of detail required both depend on the issue being evaluated and on the type of analysis. The basin assessment should address all priority issues raised by key actors. During the RBA phase, the first iteration of a basin assessment, the stakeholders identify the full range of basin-level issues that will need to be addressed and also identify the types of information needed to address them. Each issue will define the scale at which it will need to be evaluated, and so will vary for depending on the issue under consideration.

The quality control problem: The results of basin assessments should be scientifically defensible. This can be achieved through technical review of the briefing documents, with the review comments and suggestions being acted upon before the brief is released. Broad solicitation of comments should become a goal in itself, rather than just seeking simply the improvement of the documents themselves. This has major implications because conscientious review of documents requires considerable time and effort.

Another important quality control issue is how to ensure that the documents produced will actually be useful. In the case of the RBA reports, this could be accomplished by having the analysis teams specify the

types of information they themselves would benefit from if it were to be included in the detailed basin assessment.

The public involvement problem: Public involvement is required at several levels during assessment and analyses. In the first instance, the public usually knows what it cares about and what it values most to a greater extent than do the agencies that represent them. Secondly, public involvement forges a basis for community participation and buy-in. However, for this to happen, the public needs to perceive their participation as beneficial to their interests in both the short and the long-term.