



Development of a National Mega Research Project on the Integrated Watershed Management for Iran

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Introduction

Increasing population and progressing technologies can threaten different types of ecosystems throughout the globe. The problem is more serious in developing countries where emerging technologies are quickly introduced and are being applied incautiously and imprudently, while no comprehensive approach is followed up to consider all involving aspects. As such, only a program with deep insight about direct and indirect aspects of the human interventions in the ecosystem would guarantee the long-term health and profitability of the watershed resources. This approach is currently being applied to achieve the optimum use of resources, leading to sustainable and balanced outcomes through integrated planning and management in Iran, called Integrated Watershed Management (IWM). This summary articulates the process and the framework of this National Mega-Project for Iran. Following approval of the project by the High Council of Sciences, Research, and Technology of the country in 2012, a consortium consisting of four universities and a national research body was established to compile the Phase Zero Proposal as the first step. The proposal was prepared by a team of experts in the field of natural resource management based at Gorgan University of Agricultural Sciences and Natural Resources. The document consists of the justification of the research project followed by some background information and the research aim and objectives/steps. Additionally, the implementation steps for the phase zero followed by a timeframe and budget plan were included in the proposal. The main focus of the project was initiation of a new holistic approach towards the integrated watershed management at the national and regional scales for Iran. The

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development of policies, strategies, and plans in Iran to achieve equitable, efficient and sustainable use of natural resources has been identified as the foundation of the project. To highlight as many issues as possible that relate to the development of watershed management strategies, and to attain a range of ideas and feedback, a brainstorming process was arranged by conducting five nationwide workshops with highly-motivated contribution of experts from various disciplines. The workshops on project formulation, breakdown structure, and terms of reference for subprojects were convened in different universities across the country while an effort was made to involve a wide range of participants from the part of policy makers, academia, researchers, practitioners, NGOs and local communities' representatives. In formulating the project, the foundation strategies as well as supporting strategies and the potential linkages were considered to avoid duplications and streamline the whole process. The first draft of the Phase Zero Report was submitted to the relevant officials and subsequently the Phase 1 was commenced according to the project plans finalised during the Phase Zero. Currently, a few projects of the Phase 1 have been undertaken and it is expected we could deliver the outcomes to the officials in 2017. The mega-project has four phases including Phase zero and has been planned to be terminated within 3.9 years from now. Figure 1 shows the work breakdown structure of the project.

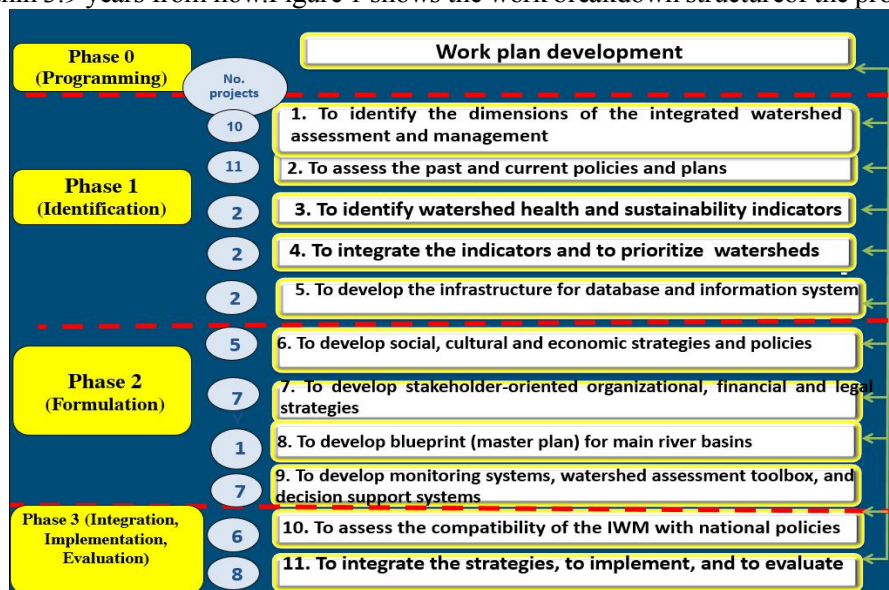


Figure 1. Work breakdown structure of the national mega project on the integrated watershed management

The main aim of the project is formulate a national scientific map for implementation of Integrated Watershed Management (IWM) in Iran. Objectives/steps required to achieve the aim are described below:

1. To identify the dimensions of the integrated watershed assessment and management

This objective includes taking below steps:

- 1.1. A review and comparative study of the national and international experiences and approaches in integrated watershed assessment and management,
- 1.2. Definition of vision and goals for the national IWM,
- 1.3. Review of national documents (strategic plans), laws, regulations, institutional structures and illustration (definition) of the inter-organizational information sharing (exchange) systems related to the integrated watershed management,
- 1.4. Definition of the integrated watershed management (IWM) and editing of an IWM encyclopedia,
- 1.5. Review and description of dimensions, criteria and methods of assessments for integrated watershed management,
- 1.6. Review and description of dimensions and methods of integrations for integrated watershed management,
- 1.7. Definition of the expected functions and roles of government and non-governmental organizations in the IWM, and
- 1.8. Identification of the role of local communities and stakeholders in IWM, and analysis of existing obstacles to their participation.

2. To recognize and evaluate the past and current situations (policies and plans) and identify the Strengths, Weaknesses, Opportunities, and Threats (SWOT) towards integrated watershed management

This objective includes taking below steps:

- 2.1. Appraisal of current codes (guidelines and instructions) for natural resources and watershed management studies in the country on the basis of IWM principles,
- 2.2. Analysis and selection of suitable criteria to evaluate the impacts of the implemented watershed management activities in the past,
- 2.3. Analysis and evaluation of an example set of watershed management projects implemented in different regions (field visits, questionnaire surveys and revision of the defined criteria, as needed),
- 2.4. Determination of shortcomings and pitfalls of the current status of watershed management in Iran and identification of the implemented examples of integrated watershed management in the country (capacities, capabilities and challenges),

- 2.5. Assessment of watersheds' resources utilization impacts (compensatory and non-compensatory impacts),
- 2.6. Analysis of the issues of inter-jurisdictional and transboundary watersheds,
- 2.7. Analysis of cultural, social, economic, technical, legal, organizational and policy-related barriers to achieve IWM,
- 2.8. Analysis and assessment of education, research, and extension systems of the country with respect to IWM,
- 2.9. Analysis and assessment of the common utilization systems of watersheds' resources and its relation with the IWM, and
- 2.10. Analysis and assessment of the impacts of development plans and projects on the sustainability of the country's watersheds.

3. To identify watershed health and sustainability indicators, to integrate the indicator and to prioritise the watersheds

This objective includes taking below steps:

- 3.1. Zonation of Iran's watersheds based on suitable criteria,
- 3.2. Determination of biophysical and socioeconomic criteria and indicators of watersheds health and sustainability,
- 3.3. Determination of threshold values of the selected indicators for assessment of watersheds health and sustainability, and
- 3.4. Zonation of watersheds based on the selected indicators

4. To weigh and integrate the indicators to prioritize watersheds for implementation of the integrated management

This objective includes taking below steps:

- 4.1. Identification and analysis of weighting and integration methods for prioritization of watersheds,
- 4.2. Prioritization of watersheds based on various perspectives (biophysical, ecological, socio-economic, and/or combination of them), and
- 4.3. Prioritization of national scale watersheds using MCDM techniques.

5. To develop a database and information platform

This objective includes taking below steps:

- 5.1. Determination of available data and information and identification of methods for data correction, completion, consistency (format, organization), and integration for the realization of IWM,
- 5.2. Designing appropriate database and infrastructure for information systems to support information circulation and service provision for realization of IWM,
- 5.3. Development and completion of a database containing observed data, spatial data and descriptive information for a pilot watershed (i.e. Project Pilot), and

- 5.4. Development and design of a watershed health and sustainability monitoring system.

6. To develop social, cultural and economic policies and strategies to achieve the goals of IWM

This objective includes taking below steps:

- 6.1. Development of methodological approaches to utilization of cultural, ideological and religious organizations capacities to achieve the goals of IWM,
- 6.2. Development of methodological approaches for the use of human capacities and their participations at different age and gender groups to achieve the goals of IWM,
- 6.3. Development of methodological approaches to use indigenous knowledge and modern technologies in IWM,
- 6.4. Survey and assessment of the capacities for income enhancement, employment and alternative livelihoods and identification of the frameworks and modern approaches to empower local communities,
- 6.5. Tangible and intangible valuation of watershed resources and functionalities and IWM accounting for a pilot watershed,
- 6.6. Development of training, extension and research strategies towards IWM

7. To develop the stakeholder-oriented administrative, financial and legal strategies for the integrated management of the country's watersheds

This objective includes taking below steps:

- 7.1. Establishment of appropriate organizational structures and administrative capacities for IWM and determination of different levels of decision-making and execution (national, regional, watershed level)
- 7.2. Determination of the legal requirements and organizational mechanisms for realization of the IWM (implementation, supervision, monitoring and evaluation of the integrated watershed management systems)
- 7.3. Evaluation of the current budgeting system, project approval and funding processes and suggestion (recommendation) of appropriate approaches compatible with IWM

8. To develop a master plan for main river basins of Iran

This objective includes taking below steps:

- 8.1. Development of major river basins plans including assessment of the current status, setting the goals, and defining the watershed rehabilitation and conservation action plans
- 8.2. Analysis of the issues associated with water allocation to different users and proposition of appropriate solutions in line with IWM

8.3. Methodological approaches for realization of IWM in urban watersheds

9. To develop monitoring programs, and to develop watershed assessment toolboxes and decision support systems (DSSs) for IWM

This objective includes taking below steps:

- 9.1. Investigation on the strengths and weaknesses of the available assessment softwares and toolboxes used in IWM,
- 9.2. Selection or development of an assessment software compatible with national conditions and with required specifications (linkable with the developed national database and information systems and web-based),
- 9.3. Assess the capabilities and limitations of available decision support systems for natural resource management,
- 9.4. Choosing or designing a decision support system suitable for Iran watershed conditions,
- 9.5. Application of the chosen or designed decision support system to pilot watersheds, and
- 9.6. Development of guidelines for adoption of decision support systems by different groups of stakeholders in pilot watersheds.

10. To assess the compatibility of IWM framework with other national strategic plans and national planning systems

This objective includes taking below steps:

- 10.1. Assess compatibility of IWM plan with state planning system and national macro-plans (e.g. policies of the Center for Islamic–Iranian Advancement (CFIA)),
- 10.2. Study relationship between the proposed applied and scientific map of IWM with national strategic documents, relevant specific rules or regulations (natural resources, environment, water and agriculture), and development plans and other related existing macro plans,
- 10.3. Review compliance of the proposed applied and scientific map of IWM with the requirements of commitment to the international conventions (Climate Change, Combat Desertification, Biological Diversity, etc.) and of joining to the regional and international treaties, organizations and unions (e.g. WTO),
- 10.4. Define relationship of the integrated management programs for natural disasters and passive defense with IWM, and
- 10.5. Study relationship of wetlands and other natural ecosystem management programs with IWM.

11. To integrate and develop a national model for IWM

This objective includes taking below steps:

- 11.1. Articulation and proposal of legal solutions and codification of the regulations and guidelines for implementation of the scientific map of IWM in the natural resources management and the national development plans as well as civil projects,
- 11.2. Compilation of regional IWM instructions (guidelines) and declaration of prerequisite regulations and standards,
- 11.3. Development of strategies for monitoring and evaluation of IWM,
- 11.4. Comparative study of the performance of the proposed IWM through a case study in a pilot watershed,
- 11.5. Revising the developed applied and scientific map of the integrated watershed management according to the results of the comparative study,
- 11.6. Prediction of physical impacts towards implementation of IWM in the pilot watershed and proposition of solutions,
- 11.7. Prediction of ecological impacts of the implementation of IWM in the pilot watershed and proposition of solutions,
- 11.8. Prediction of socio-economic impacts of the implementation of IWM in the pilot watershed and proposition of solutions, and
- 11.9. Prediction of cultural impacts of the implementation of IWM in the pilot watershed and proposition of solutions.

Future direction

Water deficiency, land degradation and desertification, and natural hazards (e.g. flood, landslide, and etc.) are creating serious long-term sustainability problems for Iran's Natural Resources. Although these issues are partly due to natural phenomena, lack of an appropriate management system and governance mechanisms assumed to play a major role in natural resources degradation.

Through a comprehensive research program that integrates multiple disciplines, the national mega project on the integrated watershed management will establish a holistic understanding of our watershed ecosystems and will provide the necessary watershed management models and tools that support evidence-based decision making. The conceptual framework of the project is going to be implemented in several pilot watersheds across the country. Although the process is perceived to be far from straightforward, it is hoped that this integrated participatory watershed management scheme will contribute to a better natural resources management and towards desirable socioeconomic outcomes for the country in line with the sustainable development goals.

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