

Background:

- One of the most important indicators of planning for Soil & Water of an ecosystem is preparation of a Master Plan for the watershed that contains a large river that flows either to the sea, desert or a wetland
- in fact, whenever a regulatory and utilization system is constructed in a watershed, the most fundamental procedures for utilization in the context of sustainable development include study, design, implementation, monitoring, protection and maintenance
- In other words, for achieving positive results in integrated watershed management for sustainable development, the most fundamental actions are conducting complete and logical studies and preparing the most fit design, followed by precise implementation

Reviewing the Features of Alborz Dam (Pashakola) Watershed

& Expected Outcomes

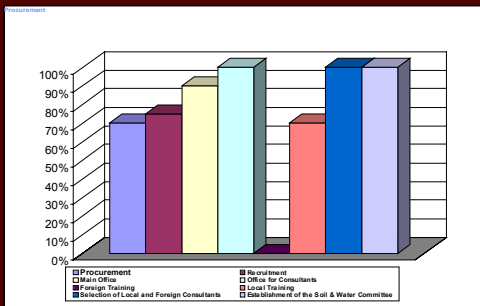
Procedures for integrated management of the Project

- 1- Study
 - 2- Design
 - 3- Implementation
 - 4- Monitoring
 - 5- Protection & Maintenance
- Range, Forest, Watershed, Fisheries & Environmental Management
- Agriculture, Horticulture, Livestock Production
- Socio-economic Activities

Main Objectives of the Project:

- Proper and sustainable utilization based on a Master Plan, development of a strategy for the area, macro and micro planning and finally implementation of the Project together with employment of public participation
- Sound and just allocation and distribution of water among users with consideration of soil protection and wise use of the potential of soil and water resources

Brief Report on Actions taken till now



Brief Report on Actions taken till now

- 1- Procurement for mobilization of the Project, Purchase of tools and machinery (field & laboratory)
- 2- Recruitment of necessary human resources
- 3- Equipping the buildings and workspace of the experts
 - Sari
 - Shirgah
 - Babol
- 4- Training and Workshops
 - Local (80%)
 - Abroad (0%)
- 5- Orientation, Technical & Coordination meetings
- 6- Selection of the Project Consultants
 - Local
 - Foreign
- 7- Establishment if the Soil & Water Committee

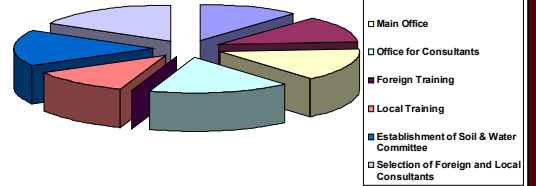
Pashakola – A pictorial view

Land Use



Forest

Brief Report on Actions taken till now



Pashakola Watershed
A pictorial view

Land Use



HORTICULTURE

Pashakola Watershed
A pictorial view

Land Use



Rice Field

Pashakola Watershed
A pictorial view

Conveniences



Access Roads

Pashakola Watershed
A pictorial view

Land Use



Range

Pashakola Watershed
A pictorial view

Conveniences



Watershed Project

Pashakola Watershed
A pictorial view

Conveniences



Forestry Project

Pashakola Watershed
A pictorial view

Status of Basin Water



Main Dam

Pashakola Watershed
A pictorial view

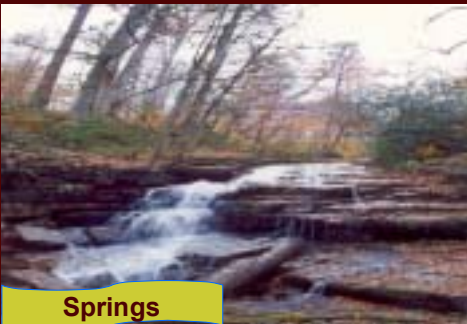
Conveniences



Fisheries

Pashakola Watershed
A pictorial view

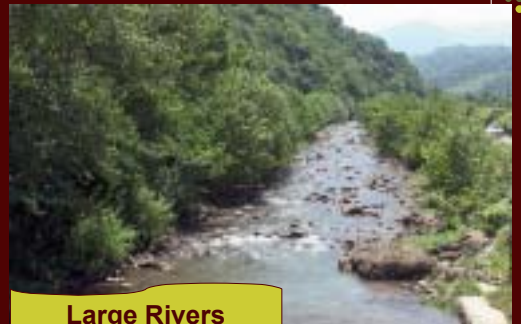
Status of Basin Water



Springs

Pashakola Watershed
A pictorial view

Status of Basin Water



Large Rivers

Pashakola Watershed
A pictorial view

Status of Water Pollution



Mud & Sedimentation

Pashakola Watershed
A pictorial view

Status of Basin Water



Levy (Ab-bandan)

Pashakola Watershed
A pictorial view

Status of Water Pollution



Raw Sewage

Pashakola Watershed
A pictorial view

Status of Water Pollution



River Pollution

Pashakola Watershed
A pictorial view

Range & Forest
Degradation



Over-Harvest

Pashakola Watershed
A pictorial view

Status of Water Pollution



Eutrophication

Pashakola Watershed
A pictorial view

Range & Forest
Degradation



Over Grazing

Pashakola Watershed
A pictorial view

Range & Forest
Degradation



Flood

Pashakola Watershed
A pictorial view

Opportunities for
Utilization



River

Pashakola Watershed
A pictorial view

Opportunities for
Utilization



River

Basin: Figures & Statistics

• Hydrometric Parameters:

- Upstream flow: 3.7 cu.m/s
- Flow of Babolroud at Raiskola Diversion Dam:
- Flow of Babolroud at Ganjafrouz Diversion Dam:
- Out-flow of the main Dam:
- Out-flow of the Raiskola Diversion Dam:
- Out-flow of the Ganjafrouz diversion Dam:
- Coefficient of Basin flow: 0.241
- Instantaneous flow of Khil Basin through the Dam
- Max. Flow in return period: 20,10, 25, 50,& 100
- Instantaneous flow of the Basin through the Ganjafrouz diversion Dam:
- Basin's mean annual flow: 1.052 cu.m/s

Basin: Figures & Statistics

• Meteorological Parameters:

- Mean Annual Precipitation (22 yr Period): 777 mm
- Max. daily rain: 21.7 mm
- Max rain in one duration: 94.5 mm
- Mean annual temperature: 13.6 C
- Mean max. annual temperature: 16.7 C
- Mean min. annual temperature: 4.8
- Min. absolute temperature: -0.75 C
- Max. absolute temperature: 25.6 C
- Annual frost period: 9 Days
- Mean annual Relative humidity: 73%
- Max. wind velocity: Not available

Some statistics on the Watershed



Socio-economic status-Agriculture and Livestock production

Area of rangeland in the watershed: 4,960 ha

Area of forest in the watershed: 46,500 ha

Plain area:

Sloped area:

Area under orchards (below the main dam):

Area under orchards (above the main dam):

Area of farmlands (mostly rice fields):

Villages in upper watershed: No. ----- occupied land ----- ha

Villages in lower watershed: No. ----- occupied land ----- ha

Cities/towns in upper watershed: No. ----- occupied land ----- ha

Population in upper area of the dam:

Population in lower area of the dam:

Annual agricultural and livestock production :

Rice: 2064 tons

Fruit: Citrus: ----- tons Others: ----- tons

Meat: Red: 7587 tons White: ----- tons

Honey: 14.6 tons Eggs: ----- tons

Milk: 2119.5 tons

Oil seeds: ----- tons

Lumber: ----- tons

Forage (range capacity): 164.9 tons

Basin: Figures & Statistics



• Specifications of the Basin

Geology, Geo-morphology: Northern slopes of Alborz Mountain Range

Base geological material in Project area: sandstone, siltstone, clay, shale

Geological history of the Project Area: Lower Jurassic

Dominant rock formations in Project Area: Sandstone

Common geo-morphological shape of the Project Area: Mountainous , foothills

Classification of land based on Soil types in Project area: Shemshak

Land units (%):

Dominant soil type in: Mountains ----- in plains -----

Topography:

Min. altitude at Dam site: 1800m

Max. altitude in the watershed area: 3302 m

Altitude at: Raiskola DD ----- Ganjafrouz DD ----- Sea level: -26 m

General direction of slope in project area: Downhill from South to North

Slope of the project area: ----- Min. slope in the Mountains: 8%

Max. slope : 40% Mean slope in the plain: 2-4%

The first step for development of an integrated management project: Development of a strategy and related action plan



Employing an ecosystem approach, component of production at the maximum carrying capacity should be identified as the axis for sustainable production. Based on the identified axis, macro and micro plans can be developed

Forestry Master Plan can be considered a Macro Plan. Related Micro Plans may include:

- Forest Management for production of paper
- Forest Management for recreation and eco-tourism
- Forest Management for protection of biodiversity
- Forest Management for production of industrial wood
- Forest Management for production of paper
- Forest Management for production of forest products

Other examples of Macro Plans:

- Horticultural Macro plan
- Recreation & Eco-tourism Macro plan
- Environmental protection Macro plan
- Livestock Industry Macro plan
- Agricultural industry Macro plan

Expected Results



1- Development of the Master Plan :

Upper watershed

Lower watershed

Project Feasibility: all the potentials must be identified and all the methods and procedures for employing them should be studied in a "Black Box" Model to reach a climax status

Ecosystem Approach: The studies should be directed to carefully cover all the components of the watershed and all the production capacities be identified

Development of the Master Plan Map and the Strategic Action Plan

4- Observing strategic policies of the project for sustainable development



One of the challenges of the project is the under-estimation of the importance of strategy development and policy/decision making in-line with sustainable development. This issue needs legal support to assure any planning be based on the potentials and capacities of the soil and water resources of the target area. The following recommendations address the means to overcome such challenges:

- > Cultural development in the pilot area
- > Proper law enforcement practices

Creation of incentives for employment and generation of income

Proper management of soil and water resources in the project area will insure successful production and increase the income of the residents of the watershed area

- Assure guaranteed sale of the products of the residents of the watershed at realistic prices
- Prepare a compensation plan for covering damages to the residents of the watershed by loss of the crops and/or natural disasters
- Facilitate improved living standards and conveniences for the residents of the watershed

Priority Actions in the Project



1- Erosion & Sedimentation control

2- Flood Control

Although the main Dam and Raiskola and Ganjafrouz diversion dams play an important role in flood control, in severe flood cases, the villages that mostly are in the vicinity of the rivers are highly susceptible to extreme damage. It is wise to assume the protection measures for the safety of these communities as highest priority and conduct the necessary planning.

3- Secure Water Supply During Drought Periods

As the results of the completion of the Dam, many hectares will be cultivated and become dependent on the water supply from the Dam, specially during the drought and water shortage periods. It is necessary to prepare plans for such periods, and following practices are suggested:

- Introduction of guidelines for drought control and remedial measures
- Introduction of water supply management procedures and implementation guidelines
- Introduction of water consumption model and estimate the volume of actual need for water based on types of crop

Securing the welfare of the watershed residents and creating incentives to avoid immigration



Another problem facing the project area is the outflow of the able, especially young and educated work force, from the villages. Potential human resources seek better opportunities and living conveniences in the cities

First Step: Preparation of the "50-100 years Rural Development Master Plan", followed by comprehensive maps defining the zones and boundaries for agriculture, livestock production, small scale industries, recreation, education and commerce

Second Step: Construction of suitable access roads and basic infrastructures needed for maintaining acceptable standards of living

Third Step: providing communication, education, health-care and cultural promotion facilities

Fourth Step: full scale law enforcement to prevent any unauthorized changes in land use and activities that do not match the general theme of the Master Plan

Find proper water supply & sustainable consumption pattern



At present, the irrigation water is allocated to and distributed by the representatives who are selected by the farmers. Water is led to the farms through traditional irrigation ditches. It is obvious that continuation of this method will not be in-line with sustainable development of soil and water resources

Water consumption needs to be regulated by laws that define the proper patterns for each consumer group. Water rights must be strictly observed and protected by law.

Providing Facilities for Production as a means for Sustainable Development



An important problem, or better said, major limiting factor in rural areas is lack of secure and promising jobs. The Master Plan should foresee activities that create long term employment opportunities in line with the major objectives

Few examples are provided below:

- I. Consolidated and participatory farming in villages and establishment of linked farm Industries in the watershed area
- II. Consolidated and participatory livestock production, or converting grazing livestock practice to centralized feeding system, and establishment of livestock related industries in the watershed area
- III. Establishment of large or small scale forest-product related chain Industries in village boundaries
- IV. Aquaculture practices using the river, levees or wetlands
- V. Establishment of Aquaculture related industries in watershed area

Schematic map of a village, its boundary and the Green Belt as described in the Master Plan

