Sustainable Development of Biosphere Reserves through promoting key ecosystem services
(Case study: small scale products in Miankaleh BR)

2013 MAB Young Scientists Award

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1- Introduction:

1-1- Ecosystem Services:

Human societies have long been aware of their reliance on the goods and services provided by nature, especially food, fuel and fiber. In recent times, the value of less tangible services, such as climate control, water filtration, soil fertility, as well as recreational and cultural services has become more apparent. As understanding deepens about human dependence on natural processes across varying temporal and spatial scales, so too does the need to measure and value these ‘ecosystem services’ within economic and management frameworks.

Ecosystem services are the benefits provided to humans through the transformations of resources (or environmental assets, including land, water, vegetation and atmosphere) into a flow of essential goods and services e.g. clean air, water, and food. Historically, humans have modified natural ecosystems to favour those species that yield direct benefits (e.g. agricultural commodities), generally overlooking the unseen but essential ecosystem services (e.g. pollination, soil fertility, insect control and erosion control) that, if lost, are expensive and sometimes impossible to replace.

Some ecosystem services, such as the regulation and stabilisation of climate, water flow, and the movement of nutrients have been even less visible until recent times, when disturbance to these systems has exacerbated climate change, soil erosion or eutrophication. Like all complex systems, ecosystems can appear to be working well until they suddenly collapse, as the supporting base may have eroded without obvious warning symptoms. A well-known example is fisheries, which may abruptly collapse even when the level of catch has been stable for years.

Another example is evident in the landscape where crops and pastures have replaced native vegetation. They have shallow root systems that do not use nearly as much of the rain or irrigation water that percolates into the soil as native plants. The excess water finds its way to the groundwater up to 10 times faster. Consequently, groundwater levels slowly rise, dissolving the natural salt in the weathered soils found over vast areas of Australia. It can take from 10 to 100 years for these changes to bring salt to the land surface or into streams (Australian State of the Environment Committee 2001). When this happens, the result can be devastating to production and to biodiversity.

Many ecosystem services have not been easy to observe until they cease to flow, hence they have not been formally counted in economic systems, or the effects of their loss have been counted as ‘externalities.’ However, when these externalities become a significant cost burden to society, such as restoring degraded river systems, it becomes a priority to understand and value ecosystem services. Until now, the most highly valued ecosystems services have been those that are directly accessible and easily measurable. This is changing as awareness of the importance of other ecosystem services increases and as some previously unpriced services are moving into markets. Ecosystem services can be bundled into four broad classes:

1. Provisioning services (mostly food and fiber commodities) along with the supporting services that need to be replaced in order for these services to continue to flow, e.g. fertilisers to replace natural soil fertility, pesticides to replace natural pest control, have long been included in market economics.

2. Regulating services where some of these services, e.g. pest regulation, seed dispersal, disease
Regulation and erosion regulation, have been artificially supplied and counted as costs of production. Other services, such as climate control, have been outside the market but are now being priced and integrated into markets, the most notable is carbon sequestration.

3. Supporting services of which most have traditionally been unvalued, although their importance has been acknowledged through government investment in soil and biodiversity conservation. Others, such as water for environmental flows, are the subject of emerging markets.

4. Cultural services include knowledge of country and place, which is important to Indigenous people. Another example is nature based tourism that has significant economic value. However, many cultural services, whilst clearly valued, have not been explicitly priced or included in markets.

As markets for a wider range of ecosystem services develop, new issues will arise, including securing a range of buyers for ecosystem services, identifying and engaging sellers of ecosystem services, ensuring markets are linked with strategic environmental and production outcomes, and making sure that market arrangements do not create unintended environmental problems.

Although the role of markets in valuing ecosystem services is increasing, the traditional role of governments in biodiversity conservation for a range of non-market and ‘public good’ reasons remains key to ensuring the flow of ecosystems services. For example, encouraging landholders, through education programs or incentive measures, to protect remnant vegetation or to re-vegetate land is likely to protect against soil loss and impaired water quality.

The process of valuing the broadest possible range of ecosystem services will generate public and private investment in the long-term supply of these services and provide insurance against system collapse or transformation. It will include both market and non-market services, as well as public and private benefits. This broad ecosystem services approach presents some challenges as identifying services can involve new ways of thinking. Measuring services can be difficult and the relationships between biodiversity, ecological functions, ecosystem services, resilience and human wellbeing are poorly understood for many services (Australian government, 2009).

The Millennium Ecosystem Assessment assessed the consequences of ecosystem change for human well-being. From 2001 to 2005, the MA involved the work of more than 1,360 experts worldwide. Their findings provide a state-of-the-art scientific appraisal of the condition and trends in the world’s ecosystems and the services they provide, as well as the scientific basis for action to conserve and use them sustainably.


## Ecosystem Services

### the link between ecosystems and human well-being

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### Supporting services

Services necessary for the production of all other ecosystem services:
- Soil formation
- Nutrient cycling
- Primary production
- Water cycling

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**Adapted from:** *Ecosystems and human well-being: a framework for assessment. Millennium Ecosystem Assessment (2003).*

**Ecosystem Services and Biosphere Reserves:**

Biosphere reserves are ‘living laboratories for sustainable development’ and represent learning centers for environmental and human adaptability. Biosphere reserves are the only sites under the UN system that specifically call for conservation and sustainable development to proceed along mutually supportive paths. Such mutuality requires cultural sensitivity, scientific expertise, and consensus-driven policy and decision-making.

Ecosystem services could be a useful conceptual framework to superimpose on the multiple functions of biosphere reserves ranging from protection to protection in land or seascapes. The essence of biosphere reserve as sustainable sites could be seen as the effort to design and develop place-specific mixes of supporting, provisioning, regulating and cultural ecosystem services that
enable the environmental economic and social well-being of resident and stakeholders communities
1-2- **Ecosystem services provided by each Iranian biosphere reserves and the beneficiaries of these services:**

Although, Iran is an important country for biodiversity, and the conservation of biodiversity and ecosystem services is seen as a priority issue by many in government and civil society alike, country were not successful in the field of ecosystem goods and services. Inappropriate policies and laws, insufficient cooperation and coordination among different organizations and civil society and weaknesses of public and authorities awareness are the main gaps in this regard. Actually, government policies for protecting the natural environment are not sufficiently integrated to provide a sustainable future. If we are to achieve sustainable patterns of economic and social development a different approach to policy development and implementation for environmental goods and services needs to be adopted. The United Nations 'Millennium Ecosystem Assessment', not only recognised the multiple benefits that ecological systems provide but also highlighted that policy and planning decisions must take into account an ecosystems approach (EA) to be truly sustainable.

According to the Environmental national law of Iran, most of protected areas are managed under pure conservation policies, so biosphere reserves which are the best sites that specifically calls for conservation and sustainable development to proceed along mutually supportive paths, as ‘living laboratories for sustainable development’ and represent learning centers for environmental and human adaptability are the best place for considering both conservation and human wellbeing.

Iran has 10 biosphere reserves: Miankaleh, Golestan, Urmia, Arasbaran, Kavir, Touran, Arjan-parishan, Dena, Geno, Hara with almost 2 million ha, that more than 500 villages located within these reserves.

1. **Urmia Biosphere Reserve**

Urmia Biosphere Reserve is located at northwest of Iran, between the two provinces of West Azerbaijan and East Azerbaijan, 18 Km to east of Urmia City. The Mediterranean air streams and the very cold air masses blown from the Caucasus Mountains have a great influence on the climate of the reserve, causing the area to have cold winters and moderate summers.

Extraction of salt by traditional techniques and ecotourism is the main economic activities within the reserve.

**Main land uses and economic activities:**

Recreation and tourism activities: The Ports and Maritime Organization, which is located on the fringe of the reserve, coordinates the natural tourism- taking tourist to the islands. It is worth mentioning that the lake had booming tourism and recreational activities before the depletion of the Lake's water level.

Boating and sailing: The locals are allowed to sail in the limited areas of the lake (Galmankhaneh port) as defined by DoE.

2. **Arjhan & Parishan Biosphere Reserve**

Arjhan & Parishan biosphere reserve is located in Fars Province covering parts of Shiraz and Kazeroon county districts.

Agriculture is the main activity practiced in the area. Near wetlands, people normally practice traditional fishery for living while at the eastern side of the wetlands, where Arab tribes reside, the people mainly practice livestock (cow) and dairy products. In highland parts of Arjhan reserve, orchards including peach, apple, walnuts, and pear are planted.
The habitants in the reserve also make crafts such as mats, and are involved in animal domestication practices as well. Apparently the agricultural and animal husbandry practices directly benefit the reserve's habitants. However, the handicrafts made by the habitants in the reserve, tourism and boating and yet harvesting and selling botanicals have indirect economic impacts on the reserve.

The major natural recreation activities in the region include leisure, camping (especially at borders of Parishan), and boating/sailing during wet seasons. Due to legal restrictions in the area hunting and fishing is limited to the habitants residing on the borders of the reserve and only for provision of living essentials.

3- **Arasbaran Biosphere Reserve**

Arasbaran is a high mountainous region with an elevation ranging from 256 to 2,896 m above the sea level. The area includes part of the Caucasus mountains with different shapes of highlands, steep valleys, high and steep mountain sides, forest lands and agricultural, mountainous and river rangelands. In addition to the natural landscape of the region, Arasbaran has areas which are impacted by the agricultural as well as livestock activities and also forests, rangelands, cultivated lands and nearly 66 villages are found in the area.

The main activities of reserve include agriculture (both rain fed and irrigated), gardening, bee and honey production, and livestock. A variety of gardening, cultivated and vegetables are produced in the reserve as allowed by the micro climate and topographic conditions of the area. Also service section (e.g. food market, clothing for the local community and services to tourists), and other activities are practiced. Also handicrafts including carpets with traditional designs, carpets and clothing using Arasbarinan wool, leather from local silk and wool, wood products, different wooden canes, traditional boxes as well as dried fruits and nuts and herbal medicine are among other activities practiced in this reserve.

4- **Touran Biosphere Reserve**

Touran biosphere reserve is the largest complex of protected areas in Iran. This reserve is located to the south of Shahroud county (Semnan Province) and a small part of it is situated at the south east of Khoranasn province.

The study area includes a range of mountains, ridges, plains, sand dunes and sand sheets. Small, scattered heights could be found in different parts of the region. In this area, due to limited water resources, the livelihood of villagers mainly depends on agriculture and ranching and the villages are usually thinly populated. Low water and scares irrigated lands have caused the growth of rain fed farming by diffusing the Kalshour River flood water among hillside villages.

There are not much mining activities in the region, but business with carpet merchants from Tabas, Neyin Sabzevar and Shahroud has boomed carpet weaving activities in the region. Some groups of migrant ranchers can pasture their herds in neighboring grasslands under definite limits during autumn and winter in 130 customary grazing territories. Fabrics used for producing cloths and accessories are an indicator of the social class of the user or the special occasion they are used for. Some of the most important handicrafts of the villagers are carpet weaving, embroidery, crocheting, knitting; Shawl weaving, fabric weaving and silk
weaving that as a result of lack of an appropriate market, suffers from recession and only carpet weaving is common in a very limited scale.

5- Central Kavir Biosphere Reserve
The central Kavir biosphere reserve is a typical type of steppe grassland in Central Asia, based on biogeography, and on the view of global biome is grassland that is also classified as a desert. The national park is a natural habitat for wildlife and birds also hosting the Salt lake with huge amount of crystallized white salt around it and an island named Sargardan, Siah-kooh mountain, natural pastures and several water springs. Also the desert landscapes that in some sites are completely empty of any plant coverage and only some halophytes in the margins, together with scenes of erosion tombs and Dark valley created as a result of natural erosion, fossils remaining in Na albeki area and the vast sandy lands of the reserve all provide unique attractions for eco-tourism. Kavir Biosphere Reserve is located in the path of traditional caravans and use of it as a hunting/recreational site by kings of Safavieh dynasty has resulted in remains of several historic monuments which enrich the value of this site. Tourism potential of the region can be divided into two groups, namely historic potential and natural potential. Natural potential comprise of natural-physical structures, vegetation cover and animal life. Central Kavir region has a diverse range of wildlife species that is the most important tourism potential of the region. Other tourist attraction of the region include rivers, springs, mountains, valleys, woodlands, meadows, dunes, wind eroded shapes, and salt desert. Carriage riding, cycling, astronomic observation, wildlife watching, camping and photography are the most popular activities for tourists in this region. Furthermore, Ghasre bahram post, which is located at this part of the Central Kavir of Iran, enjoys clear starry night sky, away from light pollution, and provides a suitable environment for horoscope planets. The more precise and detailed information is included in comprehensive management plan for the region.

6- Golestan Biosphere Reserve
Golestan Biosphere Reserve is a mountainous region located in the east of Alborz and its landscape varies from dry and rocky mountains, valleys, foot hills, mountainous forests, mountain steppes to some flat and dry plains in the east. This mountainous area is divided into northern and southern halves through a valley where the river of Madar Su flows. Natural features of the region due to having numerous water sources such as rivers, streams, springs, waterfalls and wetlands, have very high ecotourism values. The main activities of these communities include agriculture and livestock breeding. Also presence of local communities in some seasons for collecting shrubs and herbaceous plants, fruit from trees and types of parasitic or semi-parasitic plants within the reserve to be used for food, fodder for livestock and medicines is the main economic activity. Locally, some activities such as the exploitation of firewood, fodder, Edible Fungi, wild honey, forest fruits, vegetables, ibex, chamois horn collection, and food shops, as well as limited Ecotourism activities with participation of local community could be seen within the region. In addition, water resources such as some springs of this zone are used by local communities within the reserve for drinking.
Local Community make income from the reserve through the below activities: Local Guides, Handicrafts, Food Products (organic and fresh products, local bread) providing services in resorts and along roads.

7- Geno Biosphere Reserve
Geno Biosphere Reserve is formed by mountain ranges called Geno mountain that has an impressive landscape over Persian Gulf plains. The mountain is surrounded by low slope lands and plains in the south and east side and by low height hills in the northern and western parts. Geno mountain ranges and its sub-mountain are stretched from east to west. The mountains have long and very steep slopes.

The main activities of the villagers are farming and horticulture and animal husbandry.

People who live in the reserve are Indigenous communities of Bandar Abbas. The main activities of villagers are farming, horticulture and animal husbandry.

Livestock holders in the Geno BR are composed of heterogeneous population and many differences can be seen between them in social and economic terms. Their main income is through selling horticulture, livestock and agricultural products and some handicrafts that are surplus to the needs of households.

Most villages in the reserve have been settled in marginal border. Population living in these villages uses resources of area with traditional approaches for livestock breeding, selling medicinal plants and gardening. Moreover, limited tourism is prevalent.

Cultivation of fruit trees such as apple, lemon, palm are main land use in the past, besides the animal husbandry. Local people earn money by renting their rural homes to tourists as well as selling foods and handicrafts and medicinal plants.

8- Hara Biosphere Reserve
Fishing, agriculture, livestock breeding and services are the main economic activities of the local community and just services and fishing have a good prospering; traditional agriculture and animal husbandry are common as an income source to assist living expenses. Based on data collected in this research in 2002, 853 individual farmers with 815 hectares of land under cultivation (groves), and 1203 ranchers with 26,275 head of goats, 1,084 head of cattle, 2,030 head of sheep and 584 camels are active in the region. Fishing with high dependency on the mangrove forests is one of the popular activities in the region, and based on the mentioned statistics, 1,271 fishermen with 486 fishing boats are working in the area using industrial fishing methods (Stake nets and hooks(lines)) or stationary pound net.

In tourism sector, a group of people with 121 passenger boats in nine villages make services to passengers for visiting Hara forests; these boats are mainly multifunctional (Fishing, shipping, passenger).

More than 320 people are working in Hara forest and make living by selling Hara foliage.

From past to present, the main uses of Mangrove forests on the coast of Persian Gulf and Sea of Oman, has been cutting their wood and fresh buds. The fresh buds have been used to feed the livestock. In the wood industries mangroves are used as wood lumber for structural purposes, fishing, and supplying furniture and sofa.

All tourism activities in the region provide income for local people, either directly or indirectly. Boat rides around the reserve and staying in local homes directly, and buying goods produced in the region indirectly provide income for residents around the area.
9- **Dena Biosphere Reserve**
Dena has more than 40 peaks higher than 4000 meters. Qash-Mastan is the highest peak in Dena range with an elevation of 4,409 meters above sea level. Other famous peak in this range is Hose-Daal close to Sisakht city, 30 km to the north of Yasuj.
Annual precipitation in Dena range is from 600 to 1800 mm and various rivers including a branch of Karun rise in this range.
Dena has ancient historical record and is in close relation with Iranian culture and tradition. Nowadays, all the economical activities of the residents are taking place in the forest and surrounding areas. There is close relationship between the forest and foresters. Forest is the main source for the population and also livestock. The most important exploitation activities from the forest within this area include:
1. Cultivations in forest; Exploitation of the forest wood as fuel and rural uses; Exploitation of forest and surrounding areas for grazing; Exploitation of accessory products; and Dry farming development. Pastoral and tribal life styles with their special habits such as animal hunting are of their specific social structure characterizations.

10- **Miankaleh Biosphere Reserve**
Miankaleh Biosphere Reserve and Wildlife Refuge consists of two aquatic and terrestrial ecosystems:
- Inter-tidal mud with a little sandy shore
- Shallow marine waters
- Forested peat lands
- Raspberry shrubs forest
- Pomegranate and Tamarix forests
- Rangelands

The flora of the area mainly includes shrub lands, forbs, bushes and grasslands, and does not contain trees. The scrubs of pomegranate have maintained its natural growth habit in the mid-areas and particularly in the western parts of the BR. The mid-areas of the BR mainly support bushes including raspberry-juncus bushes, while much of the shoreline of the bay is fringed with a thick belt of Juncus as well as other hydromorphic plants. The herbs and grasses among the shrub lands (scrubs of pomegranate) and the raspberry-juncus bushes are mainly one year old forbs. Around 179 flora species were identified in Miankaleh Reserve
In the Sand Dunes are one of the main origins of wild pomegranate in the country, it also provides a nurturing and breeding habitat for land birds such as the Pheasants (*Phasianus*). Animal husbandry (livestock) practices, Recreational activities, Land segmentation and selling of lands/properties with private title deeds, House/building constructions by private owners, Livestock and grazing, Construction of roads between farms, Fishing, construction of fishing houses and transportation roads to transfer fish-culture products, Pomegranate harvesting during autumn which causes destruction of the vegetation cover are the main human impacts in the reserve.

Species of traditional or commercial importance:
- There are a few important fish species from the view of commercial importance like *Rutilus frisii kutum*, *Liza saliens*, *Liza auratus* and *Acipensser spp* that livelihood of some local people depend on these fishes.
● Bird watching: The wetland has a lot of natural attractions and great beauty scene from huge colonies of migrating birds and many people visit Miankaleh wetland as bird watchers every autumn and winter during a year.

● Pomegranate and raspberry harvesting and production of bio-products: A large area of the peninsula has been covered by Pomegranate and raspberry and from the past local people harvest pomegranate in autumn. Selling pomegranates products has good income for them.

The local population located at Miankaleh BR are mainly from four ethnic origins, i.e. Turkmen, Kurd, Turk and Mazani. The local communities residing within the BR normally practice animal husbandry, fish-hunting cooperatives and agriculture. The fishing nets are scattered all over the coasts in Miankaleh and the ranchers practice livestock in the whole area of the BR, tourism activities are also practiced in the area.

Main uses of each zone:

Core Zone: pomegranate orchards, juncus, aquatic plants, reedy, tree covers (specifically Alders), sand dunes, animal husbandry practices, garrets and watch towers and fish-culture cooperatives.

Buffer Zone: tree cover, pomegranate orchards, agricultural lands, juncos, sand dunes, Environmental Protection Bureaus, water channels and no-entry lands

Transition Zone: agricultural lands, villages, Amir-abad port, Neka power plant
Types of touristic activities are mainly: Hiking, bird watching, swimming and leisure at the beach, temporary camping, (no overnight lodging in the area), Photography by professional and amateur photographer (Mehrdadi, M. 2011),

1-3- **Objective of this MAB young scientists award – Miankaleh BR:**

- Promoting an environment friendly and sustainable market based approach,
- Providing information to key local authorities and stakeholders through holding workshops and meetings.

Figure 2: Miankaleh BR
2- Tasks undertaken under this project (promoting Eco – labeling)

This project conducted through following steps:

- Desk Study
- Consultation and training meetings
- Field visits
- Training workshops
- Setup a pomegranate exhibition
- Produce project documentary

2-1- Desk Study:
After almost 35 years since 9 biosphere reserves are found in Iran and a 10th one registered in 2010, many specialists believe that these sites are have not yet been able to fulfil their role as important sites for biodiversity conservation and sustainable development.

Sustainable use of Biosphere Reserves products could be advantageous for economic development of local communities, awareness raising, dynamic networking among beneficiaries, leading to better conservation of natural resources, Ecosystem services showcased through small scale pilot projects can demonstrate the advantages of BRs and to reinforce their role in the national environmental management system of Iran.

This project and its tangible results clearly show the advantage of ecosystem services of a BR and has brought changes for the local communities' livelihood.

As mentioned above, Iran has 10 Biosphere Reserve, a desk study has been done to select the best project pilot.

Main reason for selecting Miankaleh Biosphere Reserve as the project pilot site:

- Central part of the reserve, mostly is covered by Pomegranate trees (*Punica granatum*),
- The area cover 12000 Hectares of the reserve,
- Mian-ghale and Miankaleh-Sahra designated as the core zone (no harvesting is allowed in this area),
- According to a survey carried out in 2010, each hectares yields 1,000 kg of pomegranate per year. It means 1,500-2,000 tons of annual production,
- There was no plan to use this huge ecosystem service in a sustainable manner, although illegal harvest with damage to the environment used to happen.
2-2- First Consultative meeting with local authorities:

To introduce the project and get feedback and views of local authorities, first meeting was held in Miankaleh Biosphere Reserve by presence of local and provincial expert of Department of Environment and Head of the Reserve, Mr. Zaman Reza-Ahmadi.

In that meeting the main goal and target of research was explained and local authorities accepted to support us in the study. Detailed history and current situation of the pomegranate trees were discussed after.

Main challenges raised in the meeting are as followed:

- According to the National law, Department of Environment has no authority to have financial benefit within protected areas, this caused many challenges to have independent financial mechanism in BRs;

- Presence of unplanned tourist in the reserve is a cause of some damage in the area. For instance, in the reporting year, in the summer, fires occurred in an area called Miankaleh-Sahra, near the lake and lots of pomegranate trees, berries, sedges were burned in the fire. Cause of the fire was almost tourist.

- Although, DOE is not benefited from economic activities, suffered irreplaceable damages in many cases;

- According to the census taken, number of birds drops in harvesting time,
  - due to presence of hundreds of people in the region, traffic control is difficult and hunters may use this for illegal hunting;
  - as the habitats is not safe and comfort for birds, they move outside and sometimes hunted by illegal hunters,

- Sometimes people living within the reserve, do firing to land use changes to agriculture;

- Herders burning plants to provide food for their livestock (after 5 days of firing, grass is become a proper food for livestock).

At the end of the meeting it was decided that a meeting of the local communities, cooperatives, managers in local, provincial and national level, professors and experts to be held in Miankaleh, to choose the best option for harvesting pomegranate production.
2-3- **Second Consultative meeting with different stakeholders:**

For determining a Method of work, second meeting was held in Miankaleh Biosphere Reserve guard station. In that meeting professors of university, Department of Environment experts in national, provincial and local level, representatives of local communities, Cooperatives, local environmental NGOs were attended.

**Three different views:**

1. Miankaleh Pomegranate production must remain intact and no one should harvest it;
2. As in previous years, all people (near and far) are allowed to pick pomegranate;
3. A management plan is developed to regulate harvest pomegranate, in which a cooperative is established for local people to harvest pomegranate.

First opinion justified reason: Because Miankaleh Biosphere Reserve is a wild life refuges, presence of large numbers of people in a short period will cause stress on wildlife. In other hands, there are people who break the branches of trees, making fire for cooking pomegranates pickle/sauce, and distribute rubbish in the area. In addition, some are likely to do illegal hunting. Environmental NGO's, local communities living inside of the reserve and some of the environment officers were opposed to harvest pomegranate. According to NGO's amount of damage to the environment, is more than benefits from pomegranate harvesting.

Second opinion justified reason: before years’ experience showed that prevention of people to enter the reserve, make some unhappiness of the people who are used to harvest fruit from the reserve. In other hands, by establishing cooperative, it makes more rights for the people that may cause some more damage to the reserve.

Tired opinion justified reason: Should develop a management plan to form the greatest benefits to local people reached, caused reducing the concentration of large numbers of people in a short period of time in the region and the amount of damage will be reduced.

![Figure 3: Second consultative meeting with stakeholders](image-url)
2-4- **Third Consultative meeting with provincial DoE Authorities:**

By receiving different comments and feedback from the second consultative meeting, a decision making meeting was held in the office of Mazandaran DoE General Directorate and 3 raised options were discussed.

**How the authorities were convinced about the project:**

- Pomegranate can be used only until early November and afterwards it will be corroded and ultimately wasted,
- Studies show that only 30% of the fruit are used by wildlife and birds, while the rest is wasted,
- The project will create income and job for more than 500 people from local communities, drivers, and cooperatives and fruit dealers and sellers,
- To avoid mass harvest by almost two thousand visitors from other cities, that also cause stress for wildlife, noise pollution, solid waste and poaching,

The authorities accepted the third proposed option, through a systematic way of practice.
3- Implementation of the project

3-1- 7 existing eligible local environmental cooperatives were identified;
3-2- Fourth Consultative meeting with Cooperatives and NGOs
3-3- An agreement was signed with these cooperatives;
3-4- A logo designed for Miankaleh Biosphere Reserve;
3-5- A pomegranate exhibition held to promote local productions;
3-6- Training workshops were held in 8 villages to train local fruit pickers on BRs and sustainable practices while harvesting pomegranate;

3-1- Eligible local cooperatives:

Board of Miankaleh fruit pickers were contain of 7 cooperatives from the region:
1- Mr. Rajab Ramzani- Representatives of Miankaleh Herders Cooperative
2- Mr. Abbas Mostafavi- Representatives of Central Behshahr rural governor Cooperative
3- Mr. Jamal Aboutalebi, Representatives of Zagh-Marz environmental associations
4- Mr. Gholam Eskandari - Representative of the Zagh-Marz Association of Friends of Hunting and Nature
5- Mr. Ismail Naghash- Representative of the Behshahr Association of Friends of Hunting and Nature
6- Mrs. M. Bagheri- Representative of Behshahr nature tourism cooperative
7- Mr. Reza Aboutalebi- Representative of Miankaleh Tourism and Environmental Cooperative

According to the decisions of the board members:
Mr. Ramazan, Mostafavi and Jamal Aboutalebi has bank accounts right.
Mr. Naghash and Mr. Eskandari work as the supervisor
Mr. Reza Aboutalebi work as the executive officer and Procurement
Mrs Bagheri was introduced as a supervisor and auditor

Board has the stamp that is used for the side entry and verify the identification of the workers.

3-2- Fourth Consultative meeting with Cooperatives and NGOs:

To finalize the MOU a meeting has been hold in Behshahr DOE office. 7 cooperatives, district governor, DoE local authorities were attended in the meeting:

Figure 4: Forth consultative meeting with cooperatives and NGOs
3-3-Agreement with cooperatives:
To ensure the implementation of pomegranate harvest plan, a memorandum of understanding had been prepared to be signed between the head of the reserve and representative of cooperatives.

Memorandum of Understanding
Terms of pomegranate harvest of Miankaleh and Biosphere Reserve and Wildlife Refuges

Between

Local Cooperatives and Behshahr Authorities of Department of Environment

Head of Behshahr authorities of Department of Environment and representative of local environmental Miankaleh cooperatives will sign a cooperation agreement to the following terms described:

Article 1-Objectives:
1- Conservation of Habitats and wildlife
2- Sustainable use of natural resources

Article 2- Implementation Mechanism:
Fulfillment above objectives through the following mechanisms will be managed:

1- Select a cooperative representing local cooperatives in the region,
2- Workers should be selected from the local communities
3- Determine the harvesting time
4- Select one observer that his fees is provided by cooperative
5- Selling pomegranate fruit outside the reserve

Article 3- Responsibility of each party:

Cooperatives are required to:
- Supervising the process of picking fruit in the region and prevent its removal by non-designated group
- Lack of fruit harvested from core zone and critical areas, that is pointed by official authorities;
- Supervising the pomegranate exit from the legal entry;
- Supervising the remains of at least 30% of the fruit on the trees;
- To avoid over harvesting, breaking branches of trees, fire prevention, prevent any hunting in the area;
- Setup Miankaleh Exhibition outside the reserve with the sale of pomegranate and pomegranate sauce by support and guidance of the Environmental authorities and deputy governor.

Responsibilities of the Department of Environment, Behshahr Office:
- Introducing a supervisor;
- Designating the core and critical areas, where harvesting is prohibited;
- Holding training classes for workers one week before harvesting time;
- Support of cooperatives in entrance gate of the reserve;
- Monitoring of residents within Miankaleh, to do not harvesting the remained fruits belong to wildlife.
Article 4-Duration of Work:
The agreement will implement within 15 days, from 26 Mehr 1393 – 14 Aban 1393.

3-4-Miankaleh Biosphere Reserve Logo:
As one of the project target was branding of the reserve, preparing a logo for the pilot seemed necessary. In this regard, logos of some biosphere reserve were surveyed.
Then Miankaleh reserve characteristics as required elements were detected in the logo: Flamingo, Pomegranate and Sea.
4 prepared drafted logos shared with Local authorities to get their feedback, after receiving comments, 3 more logos were designed and shared for final decisions.
3-5- Setup a Pomegranate Exhibition:
An exhibition has been established by cooperation of Deputy Governor Office of the strict, Local Cooperatives, Behshar DOE office and our project. In that exhibition different type/ Families of pomegranate were displayed.
Within the exhibition, different varieties of pomegranates from the area were exhibited, Bhshahr Authorized of DoE also displayed the Miankaleh wildlife and birds in a booth.
3-6- Training Workshop:
By support of DoE local authorities, specifically training and education officer, Mr. Abu-talebi, 30 hours of training for the target groups was held in the mosque of 8 villages (Namak Chal, Yaghoub Lengeh, Yeke Tout, Zaghmarz, Zinvand, Amir Abad, Hossein Abad, Ghare Tappeh). Participants were local people, herders and NGOs.

Main achievement of training:
- 400 individuals were trained and authorization card was issued for trainers.
- On the back of the issued ID card, obligations and responsibilities of the card holders were underlined.
- For the first time participants were introduced with the concept of conservation, biosphere reserve and sustainable use.
- Other issues highlighted in classes was the role of local communities in long term conservation and sustainable use of Miankale as the heritage of their parents.
Figure 6: Training Workshops
4- Main Result:

- Direct employment of almost 600 people from local communities, drivers, and cooperatives and fruit dealers /sellers,

- Significant reduction in hundreds of cars and motorcycles entering the reserve, and less noise and air pollution,

- Local community aware of conservation which resulted in prevention of environmental degradation (destruction of vegetation, cut of trees, etc),

- The local community stopped illegal hunting and poaching that used to occur in this season,

- No more wildfire as a result of illegal camping/cooking in the site,

- Securing some fruit to be left on trees for use by wildlife (especially important for some bird and mammal species to survive),

- Local communities are convinced about the importance of the site conservation as it has improved their livelihoods.
Income generation from 15 days of work:

<table>
<thead>
<tr>
<th></th>
<th>Number of persons</th>
<th>Selling price per bag</th>
<th>income per person</th>
<th>Total income (Tomans)</th>
<th>Total income (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>workers</td>
<td>480</td>
<td>7000</td>
<td>630,000</td>
<td>302,400,000</td>
<td>113,258</td>
</tr>
<tr>
<td>Cooperatives</td>
<td>7</td>
<td>3,000</td>
<td>270,000</td>
<td>129,600,000</td>
<td>48,540</td>
</tr>
<tr>
<td>Drivers</td>
<td>100</td>
<td>3,000</td>
<td>270,000</td>
<td>129,600,000</td>
<td>48,540</td>
</tr>
<tr>
<td>First hand buyer</td>
<td>12</td>
<td>12,000</td>
<td>1,080,000</td>
<td>518,400,000</td>
<td>194,157</td>
</tr>
<tr>
<td>Total income</td>
<td>599</td>
<td>25,000</td>
<td>1,080,000</td>
<td>1,080,000,000</td>
<td>404,495</td>
</tr>
</tbody>
</table>

Average 6 bags of pomegranate collected each day by each worker

Income distribution among different beneficiaries
Figure 7: Progress of 15 days work
5- Lessons learnt :

- This project showed that participation of local communities in decision-making, management of the reserve and involvement in sustainable economic activity will result in better environmental management and less damage to the ecosystem and biodiversity of the reserve,

- Getting local communities trust will be possible once they’re convinced about the direct benefits generated for them;

- Ecosystem services will become sustainable by participation of local communities and stakeholders, if the needed capacities are built within them.

- There is strong resistance among the local authorities to open up to new approaches- they prefer to continue with their old way of thinking of pure conservation.

  - For example: a lot of effort was needed to convince the local authorities that if a protected area is used for income generation, this will not be against conservation.
6- **Recommendation:**

- Support local communities/cooperatives to find markets to sell products directly;
- Establishment of a mechanism for fund mobilization within Department of Environment to be able to collect income for conservation activities;
- Studying other ecosystem services in Miankaleh BR including raspberry and dairy buffalo products for local community participation;
- Establishment of a pomegranate product factory in a place close to Miankaleh BR;
- Study on ecosystem services in other Biosphere Reserve of Iran;
- Prepare Biosphere Reserve logo for other biosphere reserves in Iran;
**Appreciate:**

This project could be done by support of:

- Director General of the Department of Environment- Mazandaran Province Office, Dr. Nasser Mehrdadi,
- Dr. Asghar Mohammadi Fazel, Dean of University of Environment,
- Dr. Esmaeel Kahrom, Advisor of DOE
- Mr. Zaman Reza Ahmadi, Head of DOE Behshahr Office
- Mr. Darush Moghaddas, Ms. Zahra Movashagh, Mr. Bataee and Mr. Abutalebi, Department of Environment, Mazandaran Province Office,

And Ms. Mehrasa Mehrdadi, GEF/UNDP Project Deputy, Caspian Hircanyan Forest Project.
References:

- Australian government, Department of environment, water, heritage and water, Ecosystem Services: key concepts and applications Bibliography, (2009), National Library of Australia Cataloguing-in-Publication entry.