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GIS-Supported Environmental Assessment for Landscape Planning


Model and Requirements on The Regional and Community
Levels for Iran

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The major part of Iran is occupied by a moderately elevated interior basin that is bounded by high mountain systems along its Northern and Southwestern margins. The North chain, e.g. the Alborz (Elburz), represents a North branch of the Alpine-Himalayan orogenic system and runs for a distance of 960 km, separating the Caspian Lowland from the Central Iran Plateau. Ranging in width from 70 to 130km with many summits from 3600 to 4800 m in altitude, the Alborz culminates in the 5670 m volcano Mount Damavand (GSI, 2007).

The Caspian forests in northern Iran are considered one of the last remaining temperate natural deciduous forests in the world. The Mediterranean plant elements experienced significant changes due to their spread in the Tertiary Period. In other words, a number of them such as Beech (*Fagus* sp.) and Siberian Elm (*Zelkova* sp.) in Austria and Sweet gum (*Liquidambar* sp.) in Cypress and on the Kert islands were naturally selected. For instance, the genus *Liquidambar* was much more widespread in the Tertiary, but has disappeared from Europe due to extensive glaciations in the north and the Alps, which has served as a blockade against southward migration (Hsu & Andrews, 2005). However, the forested areas in the southeastern coasts of the Black Sea and south of the Caspian Sea remained intact and some plant archaeologists consider them as relict ecological systems. Along with similar North American and East Asian forest communities, these areas (e.g. southeast of the Black sea and south of the Caspian Sea) are nowadays seen as a Tertiary Period deciduous belt containing communities formerly associated with each other (RIFR 2006).

Iran is a contact point of the five phytogeographical regions¹ and the Caspian forests are located in the Hyrcanian sub-region of the Euro-Siberian region (see Figure 1 & Picture 1). This sub region covers an area of about 1.9 million ha, with a width of 20 to 70 km, from the southern coast of the Caspian Sea, up to the high mountains of Alborz, and a length of 800 km, from Gorgan to Astara (see Figure 2).

Its annual rainfall varies between 1850 mm in the West and 588 mm in the East (Sabeti, 1976). There are 65 different tree species in the region among which, some relict species, indicators of the Tertiary Period such as *Zelkova carpinifolia*, *Parrotia persica* and *Pterocarya fraxinifolia* are found.

Of 80 woody plants reported in the region, 45 species (ca. 60%) belong to the late Pleistocene.

¹ Euro-Siberian, Turanian, Mediterranean, Sahara-Sindian and Sudano-Decanian



Picture 1: Some pictures of the Caspian forests, North of Iran (source, RIFR 2004)

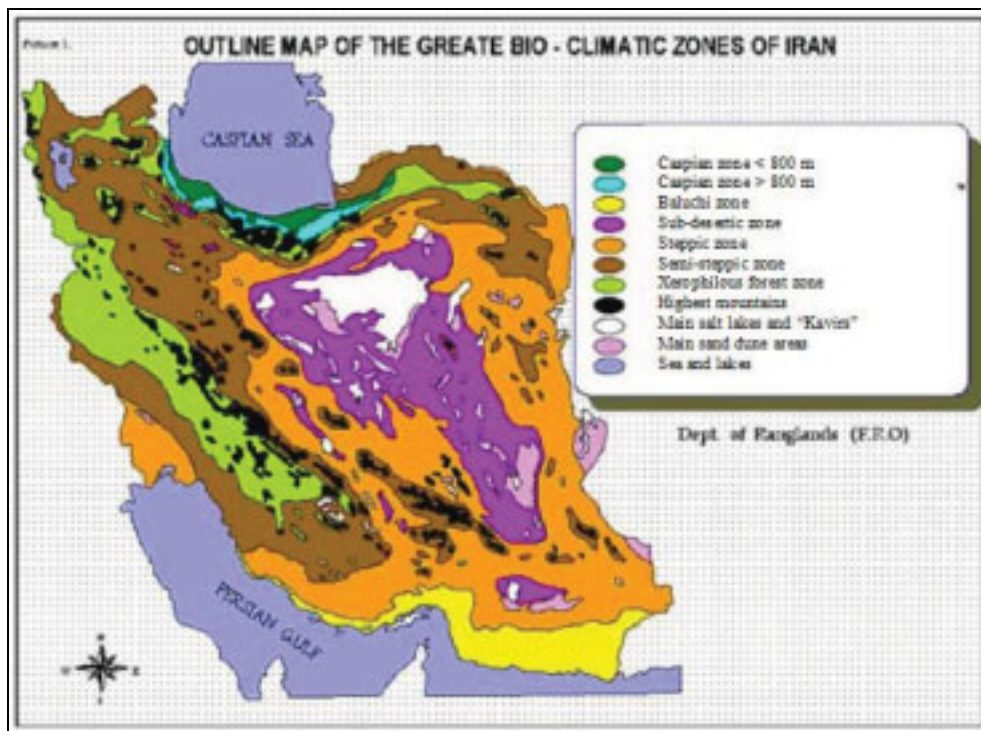


Figure 1: Bioclimatic zones of Iran (Source: Badripour, 2006)

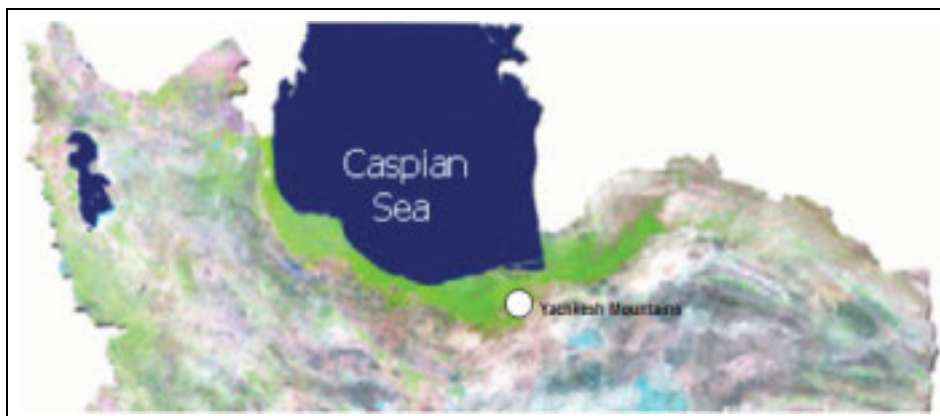


Figure 2: Geographical location of the Caspian Forests (light green) on a true Color Composite image of TM-Landsat of Iran (Source: Darvishsefat, 2002). White circle shows the approximate location of the study area

The extent of the Hyrcanian forests almost did not change during the entire Quaternary period, at least until the end of the Ice Age. It also includes about 60 species of shrubs and provides habitats for a huge number of wildlife species (RIFR, 2006). Thus, the Caspian forests are considered to be a globally and nationally important source of Biodiversity. However, they are in urgent need of protection measures and management regimes to secure their natural resources.

During the past decades, the narrow economic base in the mountainous areas and the very limited opportunities for income generation, as well as an increasing population pressure led to over utilization of the natural resources by the rural communities. Additionally, a lack of monitoring and of public participation in forestry plans increased illegal logging and overexploitation by private enterprises and local people. In mountainous areas, the livelihood system of the human communities is one of the main problems towards achieving sustainable management of the natural resources, especially forests. Cultivation and cattle-raising are the main sources of income for around 55 percent of the population, who are living in the rural areas of the Mazandaran Province (1996 census).

Due to the natural weakness of the mountainous areas for cultivation, the traditional living system is highly dependent on the forest resources. This however led to an accelerating degradation of the vegetation covers, especially during the past 3 decades. In 21 catchments areas of the main rivers of Iran, around 738 million tons of arable soils have been lost each year due to water erosion (Yakhkeshi, 2002). Increasing incidence of soil erosion, accompanied by destructive floods and declining fertility and productivity, resulted in severe degradation of natural habitats as well as negative socio-economic consequences (see Figure 3). The National Reports to the Convention of Biological Diversity (CBD) put great emphasis on the preservation and rehabilitation of the northern forest ecosystems in Iran, recognizing serious degradation and the need to take action. In these reports, threats are specified as “land clearance for agricultural use, illegal logging, forage production, overgrazing, firewood, and charcoal production”, which have reduced deciduous temperate forests by almost 40% over the past 30 years (DoE, 2004).

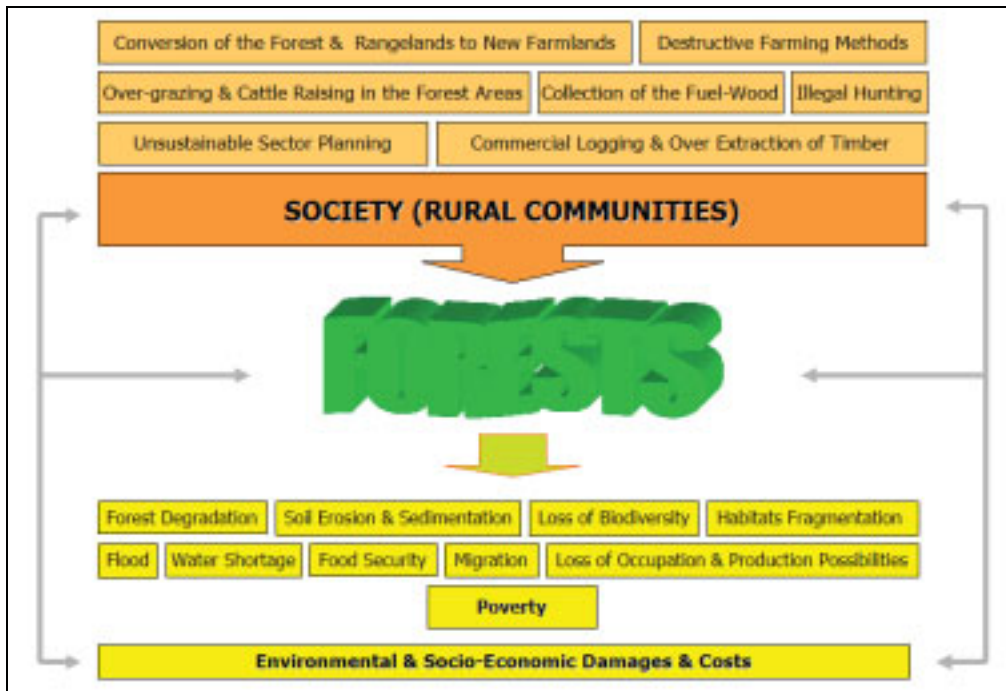


Figure 3: Anthropogenic pressures on the forest resources led to many negative ecological and social consequences (Nouri, 2005)

In addition to that, forest management plans were executed in these areas, where the local communities had developed - for centuries - their traditional utilization system for timber extraction, firewood collection and cattle-raising. The implementation of the forestry plans did not improve forest management but led to a competition between logging activities by the governmental or private sectors and the local villagers, accelerating the anthropogenic pressures on the forest resources.

Until now, most of the current planning approaches for sustainable land use (forestry, agriculture, watershed management, nature conservation, etc.) have been executed in a strictly sector-based top-down manner, without proper attention to the social potentials and needs of the people, especially on the community level. The lack of an efficient comprehensive environmental planning and management system seems to be a basic problem towards achieving sustainable development. It is clear that future development of the country needs to be conducted in a sustainable manner, in which environmental conservation and protection goals can be achieved in accordance with socio-economic needs of the society. The First National Report identified serious threats to non-protected areas from unsustainable land-use practices. It recommended major changes in the existing land-use patterns in order to address land degradation. Appropriate land-use plans and sustainable natural resource management are therefore a

priority for the country, particularly in the sensitive mountain areas. This may be supported by the process of spatial planning.

The existing environment-based land use planning concept (Makhdoum 1988 & 2002) has been successfully used as a guideline for spatial planning on the both national and regional levels. However, it could not bring efficient and practical solutions on the local scale. To a certain extent this deficiency may be caused by the lack of accurate and up-to-date data and of well-experienced planners as well as by legal or administrative constraints. Nevertheless, the most important reason is its top-down approach, which does hamper an active participation, understanding and acceptance of stakeholders in both, planning and implementation. Thus, an efficient integrated environmental planning and management system that balances the environmental conservation and protection goals with the socio-economic needs is still lacking. As the current approach is the best available national planning system which has been developed so far, all efforts should be focused on the enhancement and improvement of its capabilities by identifying and then removing its restrictions.

The research hypothesis for the following study is that the major stresses causing environmental damages in the Northern forests of Iran are related to the inappropriate development and over-utilization of the environmental resources, as a result of the top-down planning procedure with insufficient accuracy and practicability on the local scale; insufficient attention to the nature conservation and landscape management aspects; as well as deficient consideration of the local peoples needs in the current planning approaches. However, the lack of cooperation with the local communities is certainly not the only shortcoming of the planning approach. There might be also others that root in the entire conceptual framework, in the availability, quality and proceeding of the needed data, or even in the capacities of the planning staff, which have to be identified and taken into consideration in order to achieve a more efficient and successful planning procedure.

Thus, this study intends to develop a model for the sustainable management of mountain forest ecosystems that could be operated in close cooperation with local communities and governmental organizations. It mainly focuses on the protection of the forests, soil and water, while paying attention to the socio-economic needs and potentials of the rural society in a more integrated manner. It thereby intends to demonstrate the tremendous potential for integrated community-based management approaches for the protection and sustainable use of other important forest ecosystems in the Caspian region, Northern Iran.

The main goals are as follows:

- To do an exemplary root-cause analysis of forest degradation and its negative environmental consequences in Yakhkesh (Mazandaran Province), as a representative area for the mountain forests of the Caspian region.
- To refine the general GIS-based planning approach for ecological assessment in Iran, as the basic concept for nature conservation and land use planning
- To identify restrictions, deficiencies and obstacles, which are existing for environment-based regional and, more specifically for community planning
- To find alternative solutions, regarding the both ecological and socio-economic potentials and needs
- To use all of these experiences to extract a concept and recommendations for improvement and increasing the practical aspects and the participatory level of the ecological planning procedure, especially on the community level in Iran

For this purpose, the following study will theoretically reveal the existing spatial planning and natural resources management approaches in Iran in order to identify the main weak points and restrictions that could negatively affect the practicability and quality of the results (chapter II). It then looks for alternative concepts that provide a more substantial and promising consideration of sustainability aspects in the planning procedures through reviewing the general approaches in other countries, especially USA and Germany (chapter III). An exemplary ecological assessment is executed by following the current planning process in Iran and by incorporating parts of the perspective of the German approach for Landscape planning (chapter IV & V). The results of the both ecological and community assessments are used for developing some alternative scenarios, strategies and recommendations, while an operational mechanism is suggested for integrating the current governmental programs and for increasing the level of stakeholders participation in the both planning and implementation processes (chapter VI). Finally and as a conclusive summary, the most important aspects of the study are reviewed (chapter VI).