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## **An Overview of Ecological Potential and the Outstanding Universal Value of Forests Resources of I.R.Iran with respect to Climate Change**



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## Introduction:

Iran situated in the eastern portion of the northern hemisphere, in south west of Asia (Middle Eastern countries). Various environmental conditions with respect to wide latitude and longitude range; 44 ° 05 ' to 63° 18' E longitude ,25 ° 03' to 39° 47' N latitude, topographic diversity; altitude varies from – 25 to 5671 and high geological and geomorphologic diversity and also very variable from the stand point of Climate (5 Macro - Climate and many Climate Units) producing variable ecological diversity and habitats.

## phytogeographical Diversity of Iran :

Iran is contact point of 5 phytogeographical regions namely:

- Euro-siberian: Hyrcanian Sub-province of Euxino-Hyrcanian Province of Euro-siberian phytogeographical region located in the Iran
- Irano-Turanain: five provinces of east and west sub-region of Irano-Turanain phytogeographical region dominated in the different portions of country. With respects to forest ecosystem type locally known as Zagrous Dominant Forest forms Irano-Turanain Province of west sub-region of Irano-Turanain phytogeographical region.
- Mediterranean: As a Refugial flora elements of Mediterranean could be find almost in the all of the phytogeographical regions of country
- Saharo-Sindian: Flora transition from East Saharo-Arabia Sub-Region of Saharo-Sindian phytogeographical region through Persian Gulf District forms about 0.05% of flora of the country.
- Sudano – Decanian: w.r.t forest ecosystem type locally known as Persian – Omaniian Dominant Forest regarding 20 endemic species it could be called province

## Biological Diversity:

About 8000 plant species are identified which 1700 of those are endemic. Estimation of total plant is about 12000 species (167 Family & 1200 Genera). Also 168 mammals' species, 514 birds species. 206 reptiles species, 20 amphibians species 174 fishes species, 358 butterflies species and 25000 Insects species are already identified. Iran has a high domestic plants and agro-biodiversity.

Threatened Classes of Important wildlife such as *Panthera pardus* (EN c2a IUCN Threatened Class ), *Phasianus colchicus* (Vu A2cde IUCN Threatened Class) and *Tetrao mlokosiewiczi* (Vu A2 cde IUCN Threatened Class)

## Climate Change related Vulnerabilities of forests Resources Of IRI

Regarding 5 phytogeographical of Iran, the Euro-siberian: Hyrcanian Sub-province of Euxino-Hyrcanian Province of Euro-siberian phytogeographical region may have resilience to climate change.

The north temperate zone deciduous broad-leaved forests (assumed 25-50M.years).

The sub-province is a refuges of arcto-tertiary plants and continuous forest covers (assumed 2.5 million .years). Worldwide only remnants of natural nemoral forests survived, because of a long-term human influence in the temperate regions. Hyrcanian forest is natural refuges of West Eurasian temperate deciduous forest region , old-growth, natural, self-regulating forest ecosystems exist up to now. nemoral broad-

leaved forest biomes are important, because of their history and the climate in the South of Caspian Sea *outstanding, for Western Eurasia unique features*:

- Continuous forest cover since the Upper Tertiary (Pliocene Epoch): old-growth forests
- Refuges of natural woodland of Tertiary origin: the evolution of the forest ecosystems was not interrupted, neither by direct effects of the Glacial epochs nor by severe human influences
- Species-rich forests with : an *endemic tree genus* (*Parrotia*) and many species, which exist wild-growing only here or here and in the Caucasian or Euxinian (Colchic) forests (*local and regional endemic species*).

Nowadays the species such as "*Populus caspica*", "*Gleditsia caspica*", "*Parrotia persica*" and "*Pterocaria fraxinifolia*" are known as alive fossil.

Characteristics of hyrcan forests:

- richness in woody plant species
- evergreen species in the understorey and
- abundance of lianas and ferns

Regarding character hyrcan may classified as *Subtropical, Laurel, warm-temperate humid broad-leaf forests or Temperate rainforests*. But Hyrcanian forests are **nemoral forests**, i.e. temperate deciduous broad-leaf forests, although *not identical with typical mesophytic ones* . Could be consider as hygro-thermophilous [warm-humid] mixed deciduous broad-leaf forests or transitional type of deciduous forests with laurophyllous species: “summer(-green) laurel forest”

Because of the abundance of endemic and relict species the unique ecosystems, Hyrcan contribute significantly to the biodiversity of the Region . Hyrcan-Euxine province oriental endemic species among them species with additional occurrences in *Himalaya or Eastern Asia Mediterranean/ – European/ – Eurasian* species presents the latest picture of Euro-siberian phytogeographical region. The occurrence of numerous Tertiary relic and palaeo-endemic species is an evidence of these ecosystems ability to adapt to climate change. On the other word relic tree species of Caspian Forests may play a significant adaptation role and become an important target for in-situ conservation strategies.

## National Priority Actions For addressing Climate Change

Priority Action to complete National Protected Areas Network

To achieve Brundtland Commission target (10 to 12% Wilderness) and carry out our obligations with respect to Rio Convention and protect the outstanding representative of vulnerable hotspots regarding the combined effect of climate and socio – economic the following agenda should be in order:

- Review and revise existing situation of Protected Areas by a comprehensive inventory of flora and fauna
- Develop and Complete of Protected Areas network to meet international norms and IUCN goals

Anyhow a national representative of Parks and protected Areas network should cover:

- Unique portions of five photo - geographical regions and related sub-region , province and sub-province
- Hotspots and corridors

- Habitats of endemic species and species regarding IUCN classes etc.
- The Parts of photo - geographical regions as preliminary network should meet :
- Representative of photo - geographical regions
  - Good conservation condition
  - Considerable area for conservation of biodiversity and ecological process
  - Low disturbance and negative effective factors
  - Considerable diversity (e.g. biodiversity)

To develop a network model and build the National Capacity in Protected Areas management technical help of national and international scientific centers, universities, institutes and NGOs specially FAO and IUCN is highly required .

## **Key gaps, constraints and challenges Regarding adaptation of IRI forests ecosystems to climate change**

**The key gaps and constraints which combine with the effect of climate change and makes adaptation of IRI forests ecosystems to climate changes more difficult includes:**

- **Disturbances by human activities such as;**
  - **Grazing**
  - **Fire**
  - **Illegal cutting**
  - **And so on**
- **Migration patterns toward natural resources**
- **Unsustainable Development**
- **Unsustainable tourism**
- **Proper legal framework deficiency**
- **Natural unexpected disturbances;**
  - **Disturbance by fire (average annual area affected is about 8000 hectares)**
  - **Disturbance by insects (average annual area affected is about 175000 hectares)**
  - **Disturbance by diseases and etc.**

## **Recent Climate Change Activities and Funding opportunities Related to natural resources**

The table 2 shows the existing conditions of parks and protected areas of Iran. So far 11.7% of natural resources (about 7.3% of total area of the country) with different categories (i.e. National Parks, Natural Monuments, wildlife refuges, protected areas, forest reserves, forest parks and nature parks ) are under conservational management. Also further conservation activities are going on. Some about 5552000 hectare are protected as a Hunting Prohibited Areas. There are about 200 protected forest zones. A special projects are running to protect aquatic ecosystem (i.e. wetland; bog, bay, lake, river, estuarine etc.). And protection programmes of marine ecosystems and species are under consideration.

Table 2: Conservation Areas

Type	Number	Area (hec)	% Natural Resources	% Country
National Parks	16	1619750	1.57	0.98
Natural Monument	13	16255	0.016	0.01
Wildlife Refuges	33	3433927	3.4	2.08
Protected Areas	90	6559441	6.37	3.98
Forest Reserves	91	322855	0.32	0.20
Forest and Nature Parks.	56	50450	0.05	0.03
Total	387	12002678	11.7	7.3

Total area of Natural Resources: Forest, Range and Shrub land= 102859181 hectare, total area of Country: 164819500 hectare

Also 9.5 millions forests and 5.5 millions of shrub land are under multiple purpose management. About 637000 hectares of afforestation, wood farming, plantation is done during last five years and about million hectare will be under implementation by five coming years. Most funding comes from central and state governments.

## Recommendations:

To Develop a Regional Protected Area system:

IRI has a high ecological potential of Iran to establish Serial National Protected Areas, Transboundary Protected Areas Serial and Transnational Protected Areas and achieve IUCNs Global and to preserve representative of tertiary relics forests regarding climate change.

Regarding West and Central Asian and North Africa Region (WESCAN), Iran forms Mid-West Asia Geographical Unit (only country) of West Asia Sub –region (Map 1). IRI situated between West and Central Asia and as a matter of fact it is only terrestrial contact point of North Africa and West Asia with central Asia. On

the other word Iran has a very strategic location for achieving IUCN goal to develop over national network of protected areas.



**Map 1: WESCANA Region**

### Contact Point with other Regions:

As it was mentioned before Euro-siberian phytogeographical region is subdivided to sub-regions and provinces. Euxino-hyrcanian Province is one of the last survivor of this phytogeographical region. Also Euxino-hyrcanian Province is divided to two sub-province namely; Euxino sub-province and Hyrcanian sub-province.

Hyrcanian Sub-province stretches the northeast of IRI (southern coasts of the Caspian Sea, northern slopes of Alborz Mountain) which are the Last and only survivor of the Euro-siberian phytogeographical region.

Hyrcanian forests covers an area of 1.9 million hectares and extends throughout the south coast of Caspian Sea in northern part of Iran with 700-2000mm annual rainfall. It has high growth capacity due to humid temperate climate and fertile soil. These forests extends for 800km in length just throughout three Iranian provinces of Mazandaran, Golestan and Guilan.

The data about species numbers of Hyrcanian forests vary from 50 to 150 tree species (of which 36 shall be endemic to the region). The data regarding shrub species vary from 112 to 215 species. Also there are different delimitation of the area of the Hyrcanian or Caspian forests (incl. or excl. Persian oak-woodland in the high-mountain belt or the southern slopes). Anyhow extraordinary high species numbers for nemoral forests in W-Eurasia the woody plant species number is higher as in all European forest ecosystem types.

There is no forest site of Western Eurasia on the World Heritage List which could compete with the Hyrcanian Forests. This protected forests has a high capability to adapt to climate change regarding:

- continuous existence of natural forest development and evolution since the Tertiary period as well as
- to biodiversity, especially species number of woody plants, endemics and Tertiary relics

Similar type of forest ecosystems occur South of the Black Sea namely Euxine or Colchic forests. Within temperate deciduous broad-leaved forest regions of the world



the Hyrcanian and Euxine forests represent one of the very characteristic relic refugia for the mesophyllic tree and shrub flora.

The Hyrcanian and Colchic forests are the only forests of the temperate broad-leaf forest region of W-Eurasia, which can withstand a comparison with the nemoral forests of N-America and E-Asia concerning the biodiversity. Temperate deciduous broad-leaf forest regions of N-America and E-Asia differ climatically from that one of W-Eurasia:

- higher amount of precipitation in summer: vegetation season more wet
- in the South not limited by summer drought (and xerophytic biomes as open oak or juniper woodland, steppes, deserts)
- humid climate ranges continuously from the boreal to the tropical zones
- only temperature is decisive for borderlines of vegetation

Decisive influences on the biodiversity:

- recent climatic conditions
- historical reasons (smaller effect of the ice ages)
- the absence of an arid belt in the South, which separates in W-Eurasia the deciduous broad-leaved forests from the humid tropical forests

The Serial National Protected Areas, Transboundary Protected Areas Serial and Transnational Protected Areas may include:

Golestan National Park:

Golestan is situated at the eastern end of the Alburz Mountain. The altitude differs from 380 to 2410 meters above sea level. In 1956 this area entrusted to the Game Council of Iran and in 1957 became the Almehr and Ishaki Protected Areas, as the First Protected Area of Iran. The main change in name and boundary occurred in 1964 and an area 91895 hectare then became the Mohamad Reza Shah Wildlife Park. The reserve in 1970 was enlarged to 125895 hectare and designated a National Park. Some 34000 hectare has since been down graded to Protected Area. The Area of the original National Park (125895 ha) was designated as Biosphere reserve in 1970. In 1983 its name changed to Golestan National Park.

Golestan is mountainous particularly in the south-west third, but relief decreases toward the east. Golestan situated to the divide between the Caspian sea and the arid interior. Climate varies from extremely wet in the west to moderately arid in the east. Golestan is defined as transition zone between Hyrcanian Sub-province and Irano-Turanian and also with some elements of Mediterranean floristic region. The park provides a wide range altitudinal variation which makes it possible for diverse habitat in a small area to form from temperate rain forest habitat to semiarid steppic hills. Major habitat types are as follows:

- Forest habitat
- Steppic Ranges
- Scrub woodlands
- Highlands
- Semiarid lowland
- Cliffs and Craggs
- Aquatic habitats

Golestan National Park is very important for conservation of biodiversity. In the classic classification of biomes Golestan meets Mixed Mountainous Biome with

Complex and also in the advanced biogeographic province of Udvardy meets Particular unique province 2.34.12 namely ; The Semi\_ temperate Rain Forests and woodlands

I strongly believe regarding biodiversity point of view Golestan National Park can meet the criteria of convention for protection of world natural heritage.

The Park is a representative of Hyrcanian relic forest and hold a variety of endemic

CAPA: Representative Hyrcanian Sub-province:

Tallish Transboundary Property :

As last nomination to be discussed, In 2005, the State Party proposed the Hirkan (Hyrcan) Forests of Azerbaijan for inscription on the UN-List

- North west of Hyrcan Forest of Iran located on the south east of Azerbaijan nomination. The territory of Hirkan National Park include a virgin part of mountain ridges of Talish which are remarkable for their peculiar natural components. Absence of glaciation in Talish mountains, proximity of Caspian Sea that was heat accumulation reservoir and advanced the hydrothermal regime of Hyrcan area at the same time, has conserved the tertiary flora and brought its original condition as it was observed in Hyrcan- Exuni , bearing the ancient name of Hyrcan Sea (novadays knowing as Caspian Sea), is a tertiary flora center and represents a huge nature museum where numerous endemic and relic species grow. The biodiversity of the forests has been confirmed by both the historical and ecological view points. From the one side, numerous species not replaced by the glacier have preserved in refugion of the tertiary forests under the favourable climatic conditions. From the other side, a long-term isolation by the Caspian Sea from the other forests of the Euro-western Asia and arid territories facilitated to formation of the endemic species (endemics of region). The flora of the Hirkan National Park includes 1296 species (approx. 31% of the species numbers of the vascular plants of Azerbaijan. There are widely spread valuable and unique trees in the tree stratum such as Ironwood. As many as 141 species were entered into the Red Book of Azerbaijan as rare and/ or threatened species, 100 species of which only occurring Hyrcan forest. Among the three plant species, which were included in the „2003 IUCN Red List of Threatened Species“ includes *Zelkova carpinifolia* (Red list category Lower Risk/near threatened) occurs in hyrcan forest.

Regarding geological period the nominated area represents Tertiary Period(Paleocene –Mid Miocene). Iran's part located in the representative of older period ( Paleocene). The site is a typical representative of Transition zone Hyrcanian Sub-province and Euxino Sub –province (Udvardy,s biogeographic province: Caucaso – Iranian Highland ). Further study required to specify ecological boundary in the both side and nominate Tallish Transboundary Property and Establish Azerbaijan-Iran Tallish Peace ParkArticle with respect to 11.3 of Convention. Lack of proper natural boundary is possible.

Western Caucasus Transnational Protected Area:



Western Caucasus World Heritage is a typical representative of Caucaso – Iranian Highland (Udvardy,s biogeographic province). The site is one of the Global significance

Euxino- Sub- province of Turkey :

As a center of plant diversity and High transitional position between Europe and Asia. Turkish portion representative of Euxino- Sub- province situated around Black Sea Coast and surrounding mountains. Characterized by high woody species mixed coniferous and deciduous forests and Alpine Meadow with high endemism ratio. Artvin Virgin old – growth forest could be consider unique all over the world and also one the world natural Cedar forest (Cedur Libani) situated in this Euxino- Sub- province.

Irano – Anatolien Hotspots:

Irano – Anatolien Hotspots acts as corridor and refuge between the Eastern Mediterranean and western Asia. The Original area of hot spot was about 899773 square kilometres. Nowadays the remaining of hot spot is about 134966 square kilometres . Total Protected Areas of Irano – Anatolien Hotspots is about 56193 square kilometres. Only 25 783 square kilometres (19%) meets IUCN Categories. Human population density is about 58 people per square kilometres. Further study required to specify representative cluster of Irano – Anatolien Hotspots and develop national over national network of protected areas.

As mentioned earlier terrestrial Iran may act as contact point of North Africa and West Asia with central Asia to establish Serial National Protected Areas, Transboundary Protected Areas Serial and Transnational Protected Areas and achieve Convention goal to preserve representative of tertiary relics forests regarding climate change.

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1. **PRE - REGISTRATION FORM**
2. **(To be returned before 15 August 2011)**

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