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This research assessed the socio-economic and environmental values of traditional agroforestry systems in **the Province of Kohgiluyeh-and-Boyerahmad located in Zagros region in Iran** to compare them with the modern agroforestry systems in the world and recommend adaptable systems of agroforestry for Iran. For this comparison, **the state of Uttarkhand in India**, located at **the same latitude** of the study area in Iran, with similar geographical and ecological characteristics and also comparative socio-economic condition has been selected.

Attributes	Iran (K&B)	India (UL)
Map		
Geography	Between 29°49 ' to 31°28 ' N latitude and between 49°53 ' to 51°54 ' E longitude	Between 28° 43' to 31° 27' N latitude and between 77° 34' to 81° 02' E longitude
Topography	Located along the Zagros mountain ranges, unevenness could be seen almost in 80% of the province area	Lies on the south slope of the Himalaya range and steep slopes, inward slopes and valley lands form almost 90% of the area
Soil	Lime sand stone and conglomerate Sandy and limy marls and gypsum Grey and green shells	Sandy to sandy loam Alluvial sandy soil Brown forest soil Red to dark black clay
Vegetation	<ul style="list-style-type: none">• Highest elevations: conifer forests• High mountainous zone, 2000-3500m: covered with dense forests of <i>Quercus persica</i>, <i>Pistacia atlantica</i> and <i>Crataegus azarollus</i>• High hilly zone, 1500-2500m: sparse forests of <i>Quercus persica</i> and <i>Pistacia atlantica</i>.• Hilly zone, 1000-2000m: sparse forests of <i>Quercus persica</i>, <i>Amygdalus orientalis</i> and <i>Ziziphus spinachristi</i> in form of short trees and shrubs• Plains, 200-1000m: covered by very sparse vegetation and some scattered trees of <i>Ziziphus spinachristi</i>, <i>Ziziphus nummularia</i> and <i>Amygdalus scoparia</i>.	<ul style="list-style-type: none">• highest elevations: ice and bare rock• between 3000-3500 and 5000: tundra and alpine meadows to shrublands below• 3000-2600 : conifer forests• 2,600 to 1,500: Himalayan broadleaf forests• Below 1500: drier Terai-Duar savanna and grasslands belt, and the Upper Gangetic Plains moist deciduous
Forests	More than 40% of province area is covered by forests (659836 ha) which are in two major types; Mountainous and hilly stands	The actual forest area in the state is 1.539 million ha, about 35% of state area (which includes, dense forest of 0.236 million ha, medium 0.810 million ha and poor 0.493 million ha). Forests are the important source of fuelwood, fodder, timber and other major and minor forest produce.
Climate	Average Temperature is 35° and -11° in warm and cold season respectively with the average of precipitation of about 600-700 mm annually On the whole it could be say that south and western parts of the province are dry and warm while north and eastern parts are humid and moderate	The winter rains are brought by western disturbance and the summer rains by summer monsoon winds with an annual average of 1300-1500 mm There are also wide variations in temperature, due to variations in altitude from 36°C during summer and 0°C or even below during winter.
Population Density	This province has a population of 635000 which 52% lives in rural areas. 40.9/km2 (106/sq mi)	The state has a population of approximately 8.48 million . 158 /km2 (409 /sq mi)
Landuse pattern	Animal husbandry is the prime source of livelihood in two ways of sedentary and nomadic systems and after that, agriculture is the most important subsistence resource for inhabitants. Out of the total landholdings; <ul style="list-style-type: none">- 35 % are less than 1 ha which form about 2.3 % of total cultivated area. While about- 15 % are between 1 to 2 ha covering 3.7% of cultivated area- 23 % are between 2 to 5 ha in size, covering 13.5 % of total cultivated area- 27 % are more than 5 hectare constituting about 80.5 % of total cultivated area	Subsistence agriculture interlinked with animal husbandry and forestry is the prime source of livelihood for more than 70 % of the population; 70 % of landholdings are less than 1 ha, 26 % of landholdings are between 1 to 4 ha and 3 % of are above 4 ha in size
Crops	Wheat, Barley, Paddy, Maize, Peas, Beans, Lentil, Vetch, Broad bean, Water melon, Cucumber, Cantaloupe, Musk melon, Honeydew melon, Tomato, Onion, Potato, Eggplant, Squashes, Alfalfa, Clover, Sorghum, Sugar beet, Sesame, Sunflower, Colza	Wheat, maize, paddy, soybean, gram, lentil, mustard, sugarcane, turmeric, ginger, chili, black gram, ricebean, peigen pea, pea, okra, garlic, onion, capsicum, French bean, cauliflower, cabbage, rice, barley, mandua (finger millet), jhangora (white millet), pearl millet, green gram (mung), ricebean, ramdana (amaranth), potato, buckwheat
Orchards	- Cold zone: Apple, Pear, Quince, Sour cherry, Cherry, Plum, Peach, Nectarine, Apricot, Mirabelle, Almond, Walnut, Grape - Tropical zone: date palm, citruses (Orange, Tangerine, Lime, Sweet lemon, Grapefruit, Sour orange), pomegranate, fig, jujube	- Tropical zone: Mango, litchi, guava, jack fruit, papaya, aonla (Indian gooseberry), citruses (lemon, kagzi lime, orange, chakotra, galgal, mosambi etc.) - Cool zone: Apple, walnut, pear, apricot, almond, pistachio, plum

Iran

India

The results show that **Agro-ecological characteristics can be used as a basis for planning agroforestry systems. Moreover, agroforestry systems in various geographical regions with similar ecological zones, are structurally comparable.**
The study also reveals that for improvement of agroforestry systems as a feature of Sustainable Development, there are two basic points: one is **application of the power of nature** to solve its issues, and the other is use of **a complex and sustainable landuse system for nature conservation, which is agroforestry.**

Similar Agro-ecological zones	Agroforestry systems	
	Iran (K&B)	India (UL)
India: Tarai and Bhabar zone (up to 1000m) Iran: dry temperate zone (200-1000m)	The agroforestry systems are rare and only appear in form of citruses and date palm orchards in company with grasses underneath.	<ul style="list-style-type: none">• intensively cultivated because of fertile soil and plenty of irrigation water• All the agroforestry systems are well developed and commercial• poplar based agroforestry systems have a major role in area• Taungya system is very common in area
India: Subtropical zone (1000 to 1500m) Iran: temperate zone (1000-2000m)	Croplands are located under the forest cover with low productive rainfed cultivation of cereals.	<ul style="list-style-type: none">• Agroforestry systems in this zone are more traditional and less developed• In this zone, agrisilviculture, agrihorticulture, silvopastoral and agrosilvopastoral systems are generally found.• The agriculture crops are grown well seasonally and rotationally• Fodder trees are grown on field bunds and homesteads• silvopastoral systems have been developed recently
India: Cool temperate zone (1500 to 2400m) Iran: cool temperate hilly zone (1500-2500m)	Rainfed cultivation with cereals under the forest cover is a good productive way of agriculture in this area.	<ul style="list-style-type: none">• Silvopastoral, agrisilviculture and agrihorticulture systems are mainly prevalent in this zone• The major practice in the field is line planting of fruit trees on the terrace risers which are intercropped with beans or peas• silvopastoral systems are more commonly found in area• To plant fodder trees is the major plan for this zone
India: Dry temperate zone (more than 2500m) Iran: high mountainous zone (2000-3000m)	The orchards consist of various fruit species and high productive agriculture underneath the trees are the notable characteristics of this area which should be mentioned for improved agroforestry in future.	<ul style="list-style-type: none">• This zone is mainly dominated by the grasses though scattered shrubs and trees are also found• The tree species are heavily lopped for fodder and fuelwood• The main agroforestry systems are; Agrisilviculture, hortisilviculture and silvopastoral

Improvement of notable Agroforestry systems in Iran

Agroforestry system	Status in Iran	Recommendations for improvement
Trees on rangeland or pastures	A sparse combination of indigenous forest trees and nomadic livestock in forest areas	Method, species: Multipurpose trees and shrubs of fodder value. The major output is fodder for livestock production and sometimes wood.
Multipurpose woody hedge rows	A sparse combination or boundary plantation of tree species and agricultural crops and nomadic or sedentary livestock	Method, species: This is mainly a soil conservation function ensuring food, fodder and fuelwood.
Taungya	A dense combination or strip plantation of fruit trees and agricultural crops in farmlands or degraded forest area	The practice consists of land preparation, tree planting, growing agricultural crops for 1-3 years until the shade becomes too dense and then repeating the cycle in a different area. This system has scope for improvement by introducing fruit species.
Home gardens	A dense combination of fruit trees, agricultural crops and sedentary livestock	Method, species: Many species of trees, bushes, vegetables and other herbaceous plants are grown in dense and in random or spatial and temporal arrangements. Most home gardens also support a variety of animals. Fodder grass and legumes are also grown to meet the fodder requirement of cattle.
Multipurpose trees on crop lands	A sparse combination of forest species or strip plantation of trees with agricultural crops	Method, species: The primary role of this system is production of various tree products and the protective function includes fencing, social values and plot demarcation. This is being performed in all ecological regions especially in subsistent farming.

To overcome the constraints and ensure adoption of agroforestry by the rural communities in Iran, the following steps are required:

- ✓ Improve technical and practical knowledge about agroforestry.
- ✓ Improve productivity of the existing lands using agroforestry systems.
- ✓ Efficient conservation of land, soil and water through agroforestry interventions.
- ✓ Decrease technological inputs in sustainable agriculture.
- ✓ Improve the socio-economic conditions of rural life through promotion of agroforestry.
- ✓ Provide loan and subsidies to facilitate investment in agroforestry and increase the economic condition of farmers.
- ✓ A well-developed market network is required to win the confidence of the farmers.

Improvement of agroforestry systems based on Sustainable Development:

- ✓ To generate employment through apiculture, pisciculture and mushroom cultivation;
- ✓ Include various methodologies to increase forage production in rangelands and forest grounds;
- ✓ Identify methods to increase the foliage in fodder trees;
- ✓ Ensure cooperation from farmers to restore forest through establishment of multipurpose trees and shrubs;
- ✓ Application of agroforestry systems to reduce the effect of competition among components and to maintain livestock and plants in a single landuse system;
- ✓ To preserve rural and tribal culture, customs and aesthetic aspects of nature to improve the eco-tourism.

Productivity improvement in traditional agroforestry systems in Iran:

- ✓ Following are some of the national plans for sustainable development to improve agroforestry systems in the area:
- ✓ Agro-silvopastoral systems in enclosed forests or rural conventional territories;
- ✓ Tree farming norms and their improvement in northern part of Iran aiming at decreasing pressures on Hyrcanian forest;
- ✓ The national programme of local forestry for sustainable development of rural communities;
- ✓ Transfer of abandoned agricultural lands to sustainable and productive systems;
- ✓ Participatory afforestation and forest rehabilitation through recognition of community rights.