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TRADITIONAL ETHNOBOTANICAL USES OF HALOPHYTES FROM HUB, BALOCHISTAN

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Abstract

An ethnobotanical study of coastal plants from Hub, Lasbela District, Balochistan is presented. Numerous field surveys were carried out to collect information about the ethnobotanical uses of plants by local people. In total 48 wild coastal plant species from 26 families used for 12 different purposes were noted. Plant uses include fodder (56%), medicine (22%), food (5%), house hold utensils (5%), for increasing milk production in cattle (3%) and other uses (8%). Most frequently used species were from Poaceae (29%) followed by Amaranthaceae (Chenopodiaceae) (10%), Mimosaceae and Convolvulaceae (6%). About 56% of the collected plants were halophytes and rest of them were xerophytes (44%). Different plant parts were used to treat 12 disease conditions however, the use of leaves was highest (44%) followed by that of whole plants (19%). Local vegetation appears to be a major resource for the poor coastal communities which lack basic health care facilities and the information about plants has been passed on from one generation to the others in the family. With a little support, the cultivation and conservation of such natural resources, may result in sustainable maintenance and utilization of this plant wealth and uplift the socio-economic status of the people. It is also recommended that both the public and private sector should be encouraged to invest in these plants which have potential to become an economically viable industry.

Introduction

Balochistan occupies about 770 km long (70% of the total) Pakistani coast starting from Hub River in the east to the Iranian border in the west (Fig. 1). Population census carried out in 1998 indicated that about 65% of population in the province is scattered in rural areas and about 4.2% of them live along the coast (Anon., 2008). Coastal villages depend heavily on fishing for their livelihood followed by cattle farming which is about 49% of total livestock of Pakistan. There is a severe lack of basic amenities, health care facilities and education for the local inhabitants who rely on utilization of traditional plants as a primary source of medicine for themselves as well as their livestock besides their use as food and fodder.

Soil salinization is one of the most important constraints for plant growth and crop production all over the world. Around 800 million hectares of land (about 6 % of the world's total land area) are salt affected (Munns & Tester 2008). Menzel & Lieth (1999) indicated that halophytes or salt tolerant plants have multiple uses for the local inhabitants and are an underutilized resource. In Pakistan about 26% of total irrigated land is saline (Anon., 2008). Khan *et al*., (2009) established the sustainable use of *Panicum turgidum* as fodder using low quality soil and water resources that can produce ~ 50 ton / ha / year of green fodder.

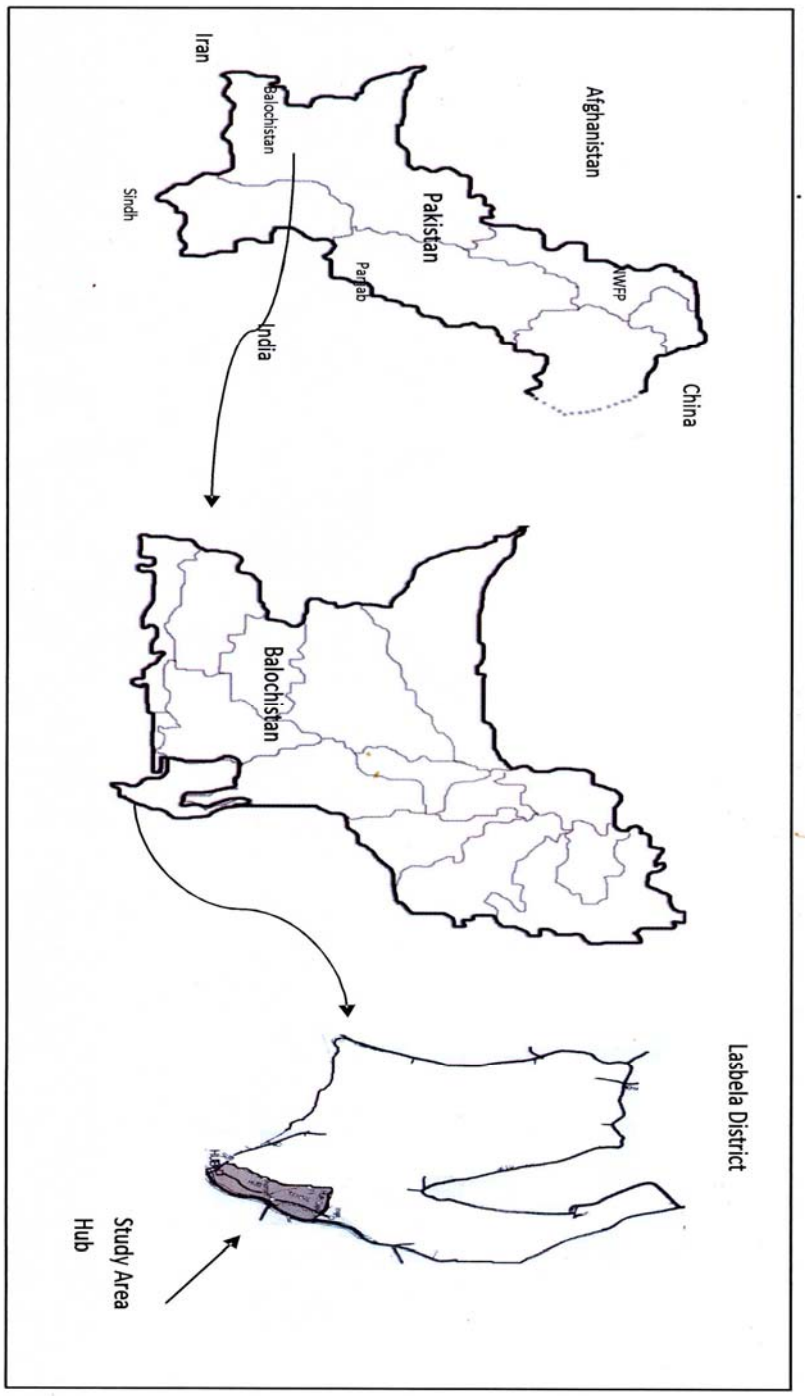

Fig. 1. Map of the study area.

Various usages particularly as medicine of plant species distributed in Makran (Southern Balochistan) has been reported (Goodman & Ghafoor, 1992; Leporatti & Lattanzi, 1994). Halophytes however, received little attention about their tremendous potential as cash crop despite their ability to thrive on poor quality water and soil conditions. The coastal plants develop morphological, physiological and metabolic characteristics not only to grow but also complete their life cycle under salt stressed conditions. Khan & Qaiser (2006) provided an extensive account of the distribution and economic uses of halophytes from Pakistan and reported high diversity among halophytes of Balochistan probably due to the diverse range of ecological habitats. A large number of medicinally important plants are halophytes. Palmarosa, lemon grass, German chamomile, periwinkle, ergot, flea seed, and milk thistle can be cited as examples (Patra and Singh, 1995). Ethnobotanical studies in various areas of Pakistan have also been carried out (Shinwari, 2010; Shinwari & Khan, 2000; Shinwari & Gilani, 2003; Qureshi & Bhatti, 2008) including those of the northern mountainous regions (Adnan *et al*., 2010) which include a considerable number of halophytes. The present research was aimed to collect and document traditional local information about the uses of some coastal plants of Hub in Balochistan.

Materials and Methods

Hub Tehsil, District Lasbela in Balochistan (25^{o} 01.621 N and 066^{o}53.025 E) is situated at the edge of Sindh just 25 kilometers from Karachi in the Saharo-Sindian Phytogeographical region (Ali & Qaiser, 1986). It has an area of 18,254 square kilometers with 81,751 inhabitants, 22% of which live in rural areas. The ethnobotanical information was collected from locals who are the custodians of this knowledge for generations. The individual plant samples collected from different localities around the year were identified with the help of Flora of Pakistan (Nasir & Ali, 1971-2002; Ali & Qaiser, 1995-2005) and divided into various ethnobotanical classes based on their habit, use and plant type. Medicinal plants were further categorized on the basis of their part used, administration methods and single or multiple uses.

Results and Discussion

Ethno-botanical information of 48 species of plants distributed in 26 families is reported for 12 different traditional usages (Table 1). These include species for fodder (33), medicine (13), food (3), increasing milk production in cattle (2), making axe handles (1), pillows (1), bird cages and baskets (1), local cigarettes (1), soap (1), dying clothes (1) and incense to ward off snakes (1). Most species belong to Poaceae (54%) followed by Amaranthaceae (Chenopodiaceae) (15%) and Mimosaceae and Convolvulaceae (12%). The predominant habit recorded were shrubs (18), grasses (15) and herbs (12) and few trees (3). Analysis of the diversity indicated multiple ethnobotanical usages of single species (Fig. 1). About 19% of the plants have multiple uses, for example *Commiphora wightii* (Arn.) Bhandari, *Euphorbia caducifolia* Haines, *Cymbopogon jwarancusa* (Jones) Schult. and *Haloxylon stocksii* (Boiss.) Benth. & Hook., and each used in more than 3 different ways (Table 1). The analyses based on plant type shows the highest proportion of halophytes (58%) including euhalophytes (33%) and xerohalophytes (25%) (Fig. 1). These are followed by xerophytes (42%) which reflect the extreme environmental conditions due to scarcity of surface or underground water resources. Plants reported here are perennials since rainfall is a rare and unpredictable event in arid and semi-arid areas. Open type of vegetation predominate the study area with annual

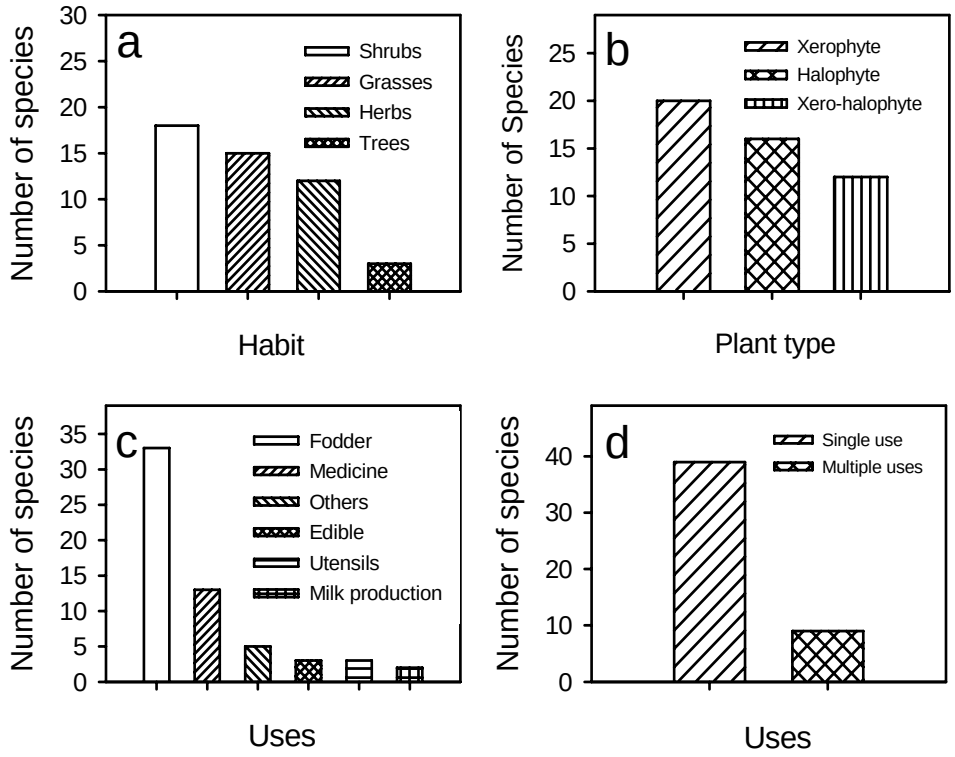

Fig. 2. Distribution of plants with respect to (a) habit (b) plant type (c) traditional uses and (d) proportion of plants with one or more uses.

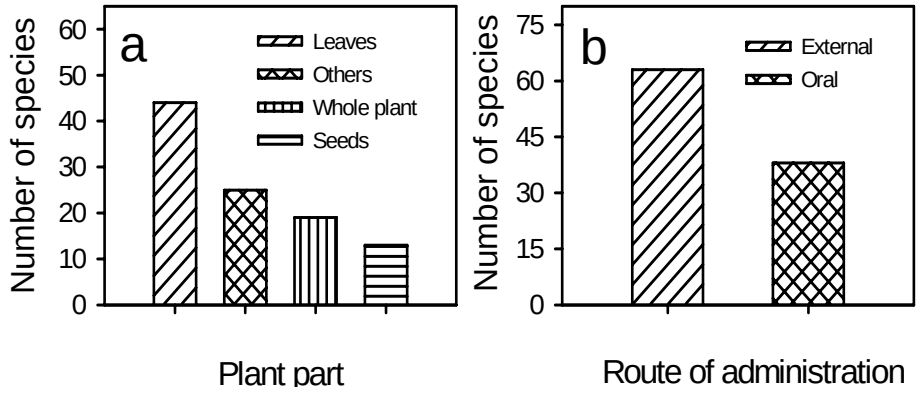

Fig. 3. Distribution of medicinally important plants with respect to (a) plant part used and (b) route of administration.

Table 1. Ethnobotanical uses of plants collected from Hub, Balochistan.

S#	Species	Family	Local name	Habit	Plant type	Use
1.	*Acacia nilotica* (L.) Delile	Mimosaceae	Khar/Babbur	Tree	Xerophyte	Seeds used for increasing milk production
2.	*Acacia senegal* (L.) Willd.	Mimosaceae	Baboor	Tree	Xerophyte	Wood used for making axe handles
3.	*Aeluropus lagopoides* (L.) Trin. ex Thw.	Poaceae	Pooji Chabbar	Grass	Halophyte	Fodder
4.	*Aerva javanica* var. *bovei* Webb	Amaranthaceae	Bhooa/Boor	Shrub	Xerohalophyte	Dried inflorescence used for making pillows
5.	*Atriplex stocksii* Boiss.	Amaranthaceae (Chenopodiaceae)	Phurki val	Shrub	Halophyte	Fodder
6.	*Capparis decidua* (Forssk.) Edgew.	Capparidaceae	Khabbar/Karairh	Shrub	Xerophyte	Unripe seeds used for making pickles; ripe seeds are edible
7.	*Cenchrus pennisetiformis* Hochst. & Steud. ex Steud.	Poaceae	Daman	Grass	Xerohalophyte	Fodder
8.	*Chenopodium album* L.	Amaranthaceae (Chenopodiaceae)	Lullar	Herb	Halophyte	Fodder
9.	*Chloris barbata* Sw.	Poaceae	Pujjar	Grass	Xerophyte	Fodder
10.	*Cistanche tubulosa* (Schrenk) Hook.	Orobanchaceae	Mootaro/Zameen zor	Herb	Halophyte	Fodder
11.	*Citrullus colocynthis* (L.) Schrad.	Cucurbitaceae	Timya	Herb	Xerophyte	Medicine
12.	*Commiphora wightii* (Arn.) Bhandari	Burseraceae	Gugar	Shrub	Xerophyte	Dry seeds are edible; Gum burned as incense to ward off snakes; Medicine
13.	*Convolvulus glomeratus* Choisy	Convolvulaceae	Sheer val	Herb	Xerophyte	Fodder and for increasing milk production
14.	*Convolvulus prostratus* Forssk.	Convolvulaceae	Sheer val	Herb	Xerophyte	Fodder
15.	*Cordia gharaf* (Forssk.) Ehren. ex Asch.	Boraginaceae	Gaanga/Peelia	Shrub	Xerophyte	Fodder and Medicine
16.	*Cressa cretica* L.	Convolvulaceae	Bukkan	Herb	Halophyte	Fodder
17.	*Desmostachya bipinnata* L.	Poaceae	Drub	Grass	Halophyte	Fodder
18.	*Eleusine indica* L.	Poaceae	Chota chabbar	Grass	Xerohalophyte	Fodder
19.	*Enicostema verticillatum* (L.) Engl. ex Gilg	Gentianaceae	Mamreechoo	Herb	Xerohalophyte	Medicine
20.	*Eragrostis ciliaris* (L.) R.Br.	Poaceae		Grass	Xerophyte	Fodder and Medicine
21.	*Euphorbia caducifolia* Haines	Euphorbiaceae	Parh'vaal	Shrub	Xerophyte	Leaves are edible, dried stem (daanda) increases milk production; Medicine

Table 1 (Cont'd.).

S#	Species	Family	Local name	Habit	Plant type	Use
22.	*Cymbopogon jwarancusa* (Jones) Schult.	Poaceae	Nadag	Grass	Xerohalophyte	Medicine
23.	*Grewia tenax* (Forssk.) Fiori	Tiliaceae	Liyaar	Shrub	Xerophyte	Wood used to make bird cages and baskets; leaves used to make local cigarettes; Medicine
24.	*Grewia villosa* Wild.	Tiliaceae	Jangli Falsa/Gangi	Shrub	Xerophyte	Fodder
25.	*Halopyrum mucronatum* (L.) Stapf.	Poaceae	Dhinni (namkeen)	Grass	Halophyte	Fodder
26.	*Haloxylon stocksii* (Boiss.) Benth. & Hook.	Amaranthaceae (Chenopodiaceae)	Khaar	Shrub	Halophyte	Used as soap; Boiled to dye clothes; Fodder; Medicine
27.	*Heliotropium curassavicum* L.	Boraginaceae	Kunjaro	Herb	Halophyte	Fodder
28.	*Indigofera oblongifolia* Forssk.	Papilionaceae	Chhal	Shrub	Xerophyte	Medicine
29.	*Lactuca sativa* L.	Asteraceae		Herb	Xerophyte	Fodder
30.	*Lasiurus scindicus* Henr.	Poaceae	Dhinni (meetha)	Grass	Xerohalophyte	Fodder
31.	*Leucus urticifolia* R.Br.	Labiatae		Herb	Xerophyte	Fodder
32.	*Lindenbergia indica* (L.) Vatke	Scrophulariaceae	Phiunl	Shrub	Xerophyte	Medicine
33.	*Lycium edgeworthii* Dunal	Solanaceae	Garathi	Shrub	Xerophyte	Fodder
34.	*Panicum turgidum* Forssk.	Poaceae	Ghimvi/Ghimmu	Grass	Halophyte	Fodder
35.	*Parkinsonia aculeata* L.	Fabaceae	Baboor	Tree	Xerohalophyte	Medicine
36.	*Phragmites karka* (Retz.) Trin. ex Steud.	Poaceae	Narrh	Grass	Xerohalophyte	Fodder
37.	*Prosopis cineraria* (L.) Druce	Mimosaceae	Core	Shrub	Xerophyte	Medicine
38.	*Salvadora persica* L.	Salvadoraceae	Jaar/Peelu	Shrub	Halophyte	Fodder and chemical source
39.	*Sesbania sesban* (L.) Merrill	Papilionaceae	Jantar	Shrub	Xerohalophyte	Fodder
40.	*Schoenus nigricans* L.	Cyperaceae	Kil	Grass	Xerophyte	Fodder
41.	*Sporobolus helvolus* (Trin.) Dur. & Schinz	Poaceae	Khay	Grass	Halophyte	Fodder
42.	*Sporobolus ioclados* (Nees ex Trin.) Nees	Poaceae	Draab	Grass	Halophyte	Fodder
43.	*Suaeda fruticosa* Forssk. ex J.F. Gmelin	Amaranthaceae	Lani	Shrub	Halophyte	Fodder
44.	*Tamarix indica* Willd.	Tamaricaceae	Lai/Gaz	Shrub	Halophyte	Fuel wood
45.	*Urochondra setulosa* (Trin.) C.E. Hubbard	Poaceae	Putaro	Grass	Halophyte	Fodder
46.	*Zaleya pentandra* (L.) Jeffrey	Aizoaceae	Vow	Herb	Xerohalophyte	Fodder and spiritual/medicinal use
47.	*Ziziphus nummularia* (Burm. f.) Wight & Arn.	Rhamnaceae	Sufi bair/bair	Shrub	Xerohalophyte	Fodder
48.	*Zygophyllum simplex* L.	Zygophyllaceae	Shams	Herb	Xerohalophyte	Fodder

Table 2. Ethnomedicinal uses of plants collected from Hub, Balochistan.

S#	Species	Family	Local name	Part used	Route of administration	Mode of preparation	Ethnomedicinal use
1.	*Citrullus colocynthis* (L.) Schrad.	Cucurbitaceae	Timya	Seeds	Oral	Ground raw seeds	For treating constipation and for massaging swollen limbs of sugar patients
				Seeds	External	Paste	Massage for swollen limbs of diabetics
2.	*Commiphora wightii* (Arn.) Bhandari	Burseraceae	Gugar	Gum	External	Burned gum	Alexipharmic
.				Leaves	External	Paste	Ointment for itch
3.	*Enicostema verticillatum* L.	Gentianaceae	Mamreechoo	Whole plant	External	Decoction	To cure fever
4.	*Eragrostis ciliaris* (L.) R.Br.	Poaceae		Leaves	External	Dressing	Used for healing infected wounds in livestock
5.	*Euphorbia caducifolia* Haines	Euphorbiaceae	Parh'vaal	Latex	External	Drops	Eye infections
6.	*Cymbopogon jwarancusa* (Jones) Schult.	Poaceae	Nadag	Leaves	Oral	Decoction	Expectorant
7.	*Grewia tenax* (Forssk.) Fiori	Tiliaceae	Liyaar	Fruit	Oral	Raw fruit	Acidity
8.	*Haloxylon stocksii* (Boiss.) Benth. & Hook.	Amaranthaceae (Chenopodiaceae)	Khaar	Whole plant	External	Boiled to get foam	Paraplegic limbs
				Whole plant	External	Ground plant material	Dressing for wounds
9.	*Indigofera oblongifolia* Forssk.	Papilionaceae	Chhal	Leaves	External	Ointment	Treatment of persistent wounds
10.	*Lindenbergia indica* (L.) Vatke.	Scrophulariaceae	Phiunl	Leaves	Oral	Decoction	Abortificent
11.	*Parkinsonia aculeata* L.	Fabaceae	Baboor	Leaves	Oral	Infusion	Arthritis
12.	*Prosopis cineraria* (L.) Druce	Mimosaceae	Core	Leaves	Oral	Raw leaves with salt	Stomach ailment
13.	*Zaleya pentandra* (L.) Jeffrey	Aizoaceae	Vow	Stem	External	Made into necklace	For treatment/ prevention of hepatitis

plants appearing after short spell of rain during the monsoon. Summer monsoon prevails towards the southern part of Balochistan while Mediterranean winds bring winter rains. Among the species documented here, 22% of the plants are used in treating different health problems. Almost all parts of various plants are used, but the use of leaves (44%) is most frequent followed by whole plant (19%) and seed (13%, Fig. 2). However, different parts of the same plant may be used for treating various ailments. Giday *et al*., (2009) reported more frequent use of roots (49%) in comparison to leaves (42%) followed by stems/barks (8%), fruits/seeds (6%) and bulbs/rhizomes (4%). Remedies prescribed for curing skin diseases and traumas are applied superficially, whereas medication for internal problems involves exclusive oral administration for the remedy (Shinwari *et al.*, 2010). However, some skin infections and traumas also involve oral administration. External application is the most frequent (63%) means of applying the remedies prescribed by the healers and other treatments are administrated orally (37%). Gilani *et al.* (2010) have recently reported the phytotoxic properties of local plant species used as medicine. Some of the interesting observations include the use of toxic plants traditionally as fodder after burning such as *Euphorbia caducifolia*. Similar examples of plants eaten in Spain after cooking are also reported for *Tamus communis*, *Bryonia dioica* and *Clematis vitalba* to remove their toxicity (Couplan, 1990).

In conclusion, the data presented in this study indicates two major uses of local halophytes that are as fodder and medicine which reflects both their basic needs and socio-economic condition. According to WHO reports more than 80% of Asia's population cannot afford formal health care facilities and therefore relies on wild medicinal plant species owing to their cultural familiarity, easy access, simple use and effectiveness (Anon., 2009). Coastal communities are desperate in their need of basic health care facilities and programs for their socio-economic uplift. Sustainable utilization of low quality brackish water for cultivating local plants has already been carried out successfully. Production of low cost fodder and medicine for the poor masses has been proven experimentally and has potential of even becoming a viable and prosperous industry. Paradoxically, research efforts for various uses of indigenous plants are increasing at a time when their use as medicine is diminishing rapidly (Al-Qura'n, 2009). Collection of ethnobotanical data from local communities will be further matched with chemical analysis of plant material to identify the principal ingredients. Therefore, better utilization of indigenous plant resources could greatly benefit the local people.

Along with the increasing awareness about medicinally important plants is the growing concern of their unrestrained use and over-exploitation (Anon., 2009). In addition global environmental changes could alter the composition of local floras which therefore should be regularly revised and the indigenous knowledge should be properly documented. As suggested above, cultivation of economically important plants on marginal saline land should also be encouraged.

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