

Managing Banni grassland

issues and opportunities

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Banni grasslands in Gujarat is the largest stretch of contiguous grasslands in India and once referred as Asia's finest grasslands is in a state of severe degradation due to environmental and induced factors. Banni alone constitutes about 45% of the permanent pasture and 10% of the grazing land available in Gujarat. Over grazing, invasion of fast growing tree species such as Prosopis sp. increase in soil salinity are some of the factors responsible for degradation. Immediate and collective efforts of different government agencies, NGOs, beneficiaries/stake holders are required for arresting the degradation.

Key words: Banni grasslands, Over grazing, *Prosopis juliflora*, Rangeland management

KACHCHH is known for vast stretches of saline deserts, salt marshes and grasslands. The two major unique grassland ecosystems in Kachchh are Banni and Naliya. Banni, once referred as Asia's finest grasslands cover an area of 2,617.72 km² constituting 51.56% grassland area in Kachchh whereas Naliya grassland covers about 654 km² (12.89%). Banni alone constitute 45% of the permanent pasture and 10% of the grazing land available in Gujarat. However, presently it is regarded as degraded remnant grassland. It occupies a low alluvial land lying 3 to 10 m above the level of Great Rann. It is located in Bhuj taluka of Kachchh district (23° 19' to 23° 52' N latitude and 68° 56' to 70° 32' E longitude). Banni is surrounded by Wagad and Beta Islands in east, Pachham Island in north, Great Rann in north-west and Little Rann and Kachchh mainland in south. The name Banni thought to have its origin from local Kachchhi word Bannai (*Bannai hui* in Gujarati) meaning 'made up' indicating the land was formed from sediments.

Animal husbandry is the main source of livelihood of the people of Banni region. The local inhabitants of

the Banni region known as *Maldharis* are believed to have their origin from the Sindh region in Pakistan. It is believed that the ancestors of present *Maldharis* were granted Banni grassland as common property by Maharao of Kachchh with the condition that they protect the grassland ecosystem and share it commonly for grazing and not use it for agriculture or divide it up into private property and after imposition of grazing tax. *Maldharis* follow migratory pastoralism and have a long history of at least 5 centuries. The association of 22 ethnic communities of *Maldharis* residing in 48 villages of 19 *Panchayat* use the grassland by dividing access to various parts of Banni which was declared as forest land in 1955. Disputes about regional right exist among forest department, revenue department and pastoral association.

Present status

The present status of Banni grassland is discussed here.

Soil and water resources: The soils of Banni are of alluvial origin with sandy texture. The soil salinity varies from 1.0 to 15 dS/m. The problem of salinity in these areas was increasing

in the recent past. Primary reason is the geomorphology of the region and low-lying alluvial land receiving discharge of salt laden runoff brought by rivers such as Khari, Bhurud, Nara, Kaswati and Panjora. The surrounding sea brings salts by tidal processes. The aridity of the region, add to the salinity problem through heavy evaporative demand bringing salts to the surface. The soils are mostly clay loam to silty clay loam having clay content of 20-4 %. The presence of high silt and clay contents lessen the vertical and lateral movement of surface and subsurface water which creates water logging and flooding in low lying areas after monsoon (Fig. 1)

The sub-surface water in Banni exists at shallow depth of about 3 m, which is very saline and is not suitable for drinking or irrigation purpose. However, in the region, local people adopt a very unique water storage system called Virda. In Virda, rainwater is harvested and used for drinking purpose in remaining months.

Vegetation resources: Major tree species are *Prosopis juliflora*, *Acacia nilotica*, *Acacia leucophloea*, *Acacia senegal*, *Salvadora persica*, *S. oleoides*,



Fig. 1. Flooded Banni grass land during monsoon



Fig. 2. Invasion of *Prosopis juliflora* in Banni grassland

Capparis decidua, *Tamarix* sp. and *Azadirachta indica*. Because of wider adaptability to harsh conditions and fast dispersal rate of seeds, *P. juliflora* is the dominant tree species and has suppressed or replaced other trees. Major grasses grown in the area include *Sporobolus marginatus*, *S. pallidus*, *S. helvolus*, *Dichanthium anulatum*, *Cenchrus ciliaris*, *C. setigerus* and *Desmostachya bipinnata*. These grasses grow in the low to moderate saline areas. In the highly saline areas, halophyte grasses such as *Aeluropus lagopoides* and *Urochondra setulosa* and non-grass halophytic plants such as *Cressa cretica*, *Suaeda nudiflora*, and *S. fruticosa* are common in these areas.

Human and livestock population: In Banni, altogether, 13 different communities inhabit (over 4,000) the area and vast majority belongs to the *Maldharis* who reside in 48 villages or 'wandh'. There is a traditional form of human-livestock-grassland interaction, which is still predominant in Banni. At present the total livestock population is about 72,356 (as per 2012 record). The herders, especially the *Maldharis* of the area keep animals of superior breeds, supplying them to various parts of the state and even to other neighbouring states. However, due to establishment of milk co-operative societies, the people of Banni are inclined towards selling the animal products such as milk and butter. The livestock of Banni area include cattle, buffaloes, sheep, goats, horses, donkeys and camel. There are two breeds of cattle, viz. Kankrej and Gir, of which Kankrej is the heaviest breeds of the Indian cattle and known

for excellent drought resistance capacity. Over years of survival in the harsh climatic regime, the traditional livestock breed of the area were evolved as one of the most productive buffalo in India and Banni buffalo is recently recognized as 11th distinct buffalo breed of the country by National Bureau of Animal Genetic Resources, Karnal.

Major issues of Banni grasslands degradation

Soil salinity: The constructions of dams during 1960s across rivers on the northern side of Kachchh draining Banni area arrested water flow to the area and annual fertilization through riverine deposits of sediments. The flushing out of salts were stopped by these dams and salinity ingress by Arabian Sea persisted without check. The grasslands presently strive to thrive on limited and sporadic rainfall. Construction of road in Punjabi in 1965 caused the seawater entry to the northern part of Banni from Kori creek, resulting in increasing soil salinity in the area. The salt laden winds from Great Rann and Little Rann is also responsible for increased salinity in the areas of poor land cover.

Grazing pressure: The livestock pressure on this grassland is immense. As a large population of livestock graze on finite resources more than its carrying capacity, the ecosystem do not get adequate time to rejuvenate. Due to overgrazing the rangelands get eroded and vegetation become sparse, since eating away of vegetation is more than natural regeneration of grasses. Ultimately palatable grass species vanishes and

unpalatable species stay back and in due course of time dominate and proliferate in the rangeland. Coupled with poor rainfall and high temperature which are characteristics of the region, the degradation of grassland aggravates. As these lands are designated as common property resources without legal rights, herds from other areas of Gujarat and Rajasthan are sometimes brought to graze on these areas mounting grazing pressure further. The overgrazing, apart from having its effect on natural succession, has impact on soil properties due to frequent and heavy traffic of animals in the rangeland.

Invasion of *Prosopis juliflora*: The *Prosopis juliflora* was introduced to meet the fuel wood demand around 100 years ago, by the then King of the princely state of Radhanpur. The first large-scale planting of the species in Gujarat was reported to be in 1894. Forest department promoted the tree for arresting soil erosion, salinity ingress, and desertification and to green the desert in the early 1960s. Due to very high survival ability, its unique coppicing potentials and seed dispersal rate, this tree species invaded at a faster rate and occupied the place of grasses (Fig. 2). Due to fast growth rate, it suppresses other vegetation in the area. During 1980, about 9.85% of the Banni grasslands were covered by *P. juliflora*. The over grazing animals increased the spread of the species by aiding dispersal of seed through their droppings.

Strategies for Banni restoration

Stakeholder participation and

institutional support: The involvement and participation of pastoral community is a pre-requisite while initiating any programmes to revitalise the grassland. Many NGOs are working in association with pastoral communities for developing this grassland. A huge investment is also required for doing activities such as fencing and other field works. Adequate support must be provided to supply additional fodder demand so that over grazing is not practised allowing natural growth and rejuvenation of grassland.

Scientific grassland restoration: For realizing a successful restoration of the degraded pasture land, a scientific plan needs to be developed. This should start with assessment of current situation and delineation of areas needing intervention. Being a common property resource, the restoration is only possible in a phased manner. The scientific protocols to be followed by the implementing agency need to be identified.

Demarcation and protection of area: The first step in the rangeland improvement is protection of the site from biotic factors like stray animals. Angle iron posts with barbed wire fencing were found to be most effective and economical in the long run. If properly maintained, these fencing last for more than 20 years. Other fencing includes, trench fencing, core wall thorn fencing or live hedge fencing. In trench fencing, trenches of trapezoidal shape of 1.5 m wide at the top and 1 m deep are dug around the area of grassland improvement.

Clearing of bushes: All the unwanted bushes and vegetation are to be cleared by manual, mechanical or chemical means. The efficiency of manual or mechanical methods can be enhanced by applying selective herbicides on the cut stumps to prevent bushes from coppicing. The bushes like *Ziziphus nummularia* can be retained to a medium density level for the benefit of browsing animals like goats.

Addition of manures and fertilizers to improve soil fertility: The natural grasslands can be fast rejuvenated by application of inorganic fertilizers

and it enhances both production and quality of grasses. The natural grasslands dominated by grasses can be supplied with 40 to 60 kg N / ha. When grasslands contain large amount of legumes, the dose can be reduced to 20 kg N/ ha and additionally P_2O_5 can be added @ 30 kg/ha.

Soil and water conservation: The measure of soil and water conservation when introduced into the rangelands will be very useful in hastening the regeneration of different species of grasses and shrubs. Contour and peripheral bunding, mulching, wind breaks and shelter belts, water storage streams and pitting were found suitable as soil and water conservation practices.

Reseeding with improved grasses and legumes: For rejuvenating deteriorated rangelands, low-yielding and non-palatable grasses can be removed and replaced with improved palatable grasses and perennial forage legumes. The selection of different species and varieties are to be made based on the prevailing local agroclimatic conditions and animal preference. Trees, shrubs, grasses and legumes in a mixed silvipastoral combination will serve the needs of diverse animals and ecological stability in the region. In highly saline areas palatable halophyte grasses like *Aeluropus lagopoides* and *Sporobolus marginatus* may be used. The reseeded with suitable perennial forage legumes like *clitoria* and *stylo* provide dual advantage of supplying protein rich fodder to the livestock and improving the fertility status of rangelands.

Introduction of top feed species: Introduction of common top feed species in rangelands is beneficial in meeting food and fodder requirement of livestock especially in drought years. They provide fodder from leaf twigs and pods. Besides fodder, some of these species also provide fire wood, timber for building and fencing, fruits, vegetables, gums, medicines etc. They are also helpful in providing shade to the animals in the desert rangelands apart from the ecological functions on vegetation stabilization and sustainability. The common top feed species are listed

below.

- 1 *Prosopis cineraria*
- 2 *Ziziphus nummularia*
- 3 *Salvadora oleoides*
- 4 *Salvadora persica*
- 5 *Ailanthus excelsa*
- 6 *Moringa olifera*
- 7 *Hardwickia binata*
- 8 *Acacia tortilis*
- 9 *Calligonum polygonoides*
- 10 *Acacia senegal*
- 11 *Acacia nilotica*

Restricted and scientific grazing: Controlled and improved grazing provide the advantage of breaking the top crust of soil, by working through the hooves of livestock and thereby encourage better percolation of water for plant use and better yield of pasture. The studies conducted at CAZRI, Jodhpur indicated that forage production is increased when the forage was utilized through deferred rotational system compared to continuous system of grazing. However, continuous controlled grazing is beneficial for highest livestock returns. Grassland management by putting more than one kind of animals were found to be beneficial as it allows utilization of diversified forage species more effectively. Adequate grazing scheme is to be practised depending on the local conditions like availability of pasture species, type of livestock to be grazed etc.

SUMMARY

The grasslands at Banni is in extreme degradation state and is being further degraded at faster rate. Uncontrolled grazing, increasing salinity and invasion of *P. juliflora* are the major factors causing accelerated degradation. Steps need to be taken for controlling the indiscriminate grazing and adequate control/monitoring with local participation is necessary to give enough time for the pasture to develop. The system of deferred controlled grazing can be advocated. Adoption of scientific management practices with active involvement of stake holders and policy makers can only come to the rescue of the precious resources.

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