

A report on the two day
National symposium on “***Prosopis*: Ecological, Economic Significance
and Management Challenges**”

20-21 February 2009

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Of all the exotic species, *Prosopis* is probably the one which attracts highest level of attention from diverse groups like researchers, forest managers, policy makers and even general public due to its economic advantages and ecological disadvantages. *Prosopis juliflora* is a shrub/tree species, indigenous in dry lands of western South America, which was intentionally introduced to Rajasthan and Gujarat. Since its introduction some 140 years ago, driven by concerns of desert encroachment and for dry land livelihoods, *Prosopis* has rapidly spread, currently inhabiting most dry lands, thus covering some 40% of the land of India. This spread has brought about significant changes in the structure and function of India’s dry land ecosystems and in the benefits people derive from these ecosystems (namely “ecosystem services”). Some services have been regionally or locally augmented, such as soil conservation and firewood provision, and others have been degraded, such as livestock forage provision and the support of biodiversity.

Given the above, and especially its detrimental effects on ecosystems and biodiversity *Prosopis* would qualify as an “invasive alien” species, that international agreements call for its eradication. However, given already realized and many more potential augmentation of certain ecosystem services, the benefits of the species needs to be assessed against its negative effects, and this on a regional, local, and the community scale. In general, there is inconclusive discussion *vis-à-vis* its management for eradication and promotion among these different groups. In the light of this management dilemma, a two day national symposium on “*Prosopis*: Ecological, Economic Significance and Management Challenges” was organised by Gujarat Institute of Desert Ecology (GUIDE <<http://www.gujaratdesertecology.com>>) at

Bhuj, during 20-21 February 2009 (<http://www.nspc.gujaratdesertecology.com>), to discuss and deliberate on various issues of *Prosopis* management and research. Various stakeholders of *Prosopis* participated in the symposium in an attempt to step forward towards achieving a viable and enduring management decision on *Prosopis*.

Driven by these needs, a large array of information on *Prosopis* from different parts of India and a wide spectrum of opinions on current and projected management options of this species were presented by 27 participants of the symposium. The papers selected for presentation during the five sessions were collated and symposium proceedings were brought out in the inaugural session, which includes key research findings of participating research institutions across the country. The presentations in the symposium and subsequent discussions can be aggregated into two diverging attitudes regarding future management of *Prosopis*. One is that the species is a liability and management should strive for its eradication, and the other is that given its current state in India the species is an asset, and management should strive to promote its use. Though these two diverging attitudes seem unbridgeable and the two camps seem uncompromising, a disengagement strategy emerges from the proceedings of the Symposium.

Uriel Safriel (Hebrew University, Jerusalem, Israel; and Presently Coordinator, Global Network of Dry land Research Institutes: “GNDRI”) in his concluding lecture during the final session briefed about the outcomes of the symposium and opined that there is no disagreement regarding the fact that *P. juliflora* in India is an **introduced species**. Following their introduction, introduced species can be classified into two groups: one is that of invasive aliens, and the other as introduced cultivated species. Though invasive aliens are often a result of non-intentional introduction whereas introduced cultivated species are in most cases a result of an intentional introduction, there are many exceptions to this dichotomy. Regarding *P. juliflora*, its intentional introduction was followed by a non-intentional spread, one which poses threats to biological diversity, thus it qualifies as an **invasive alien** species. Rachna Chandra, (Sálim Ali Centre for Ornithology and Natural History-SACON, Coimbatore) during one of the technical sessions, discussed her findings on the effect of *P. juliflora* on herbaceous diversity in Keoladeo National Park, Bharatpur, Rajasthan and stressed upon the fact that lower vegetation diversity is seen in mature *P. juliflora* stands. But by the same token *Prosopis* has been proven to be beneficial in various and diverse respects and observations and experiments demonstrated additional potential and projected benefits.

Note in this context that ever since the “agricultural revolution” mankind has learned to domesticate and cultivate wild species of an economic promise. Since an economic promise of the species in India has been already identified, it becomes irrelevant whether or not this species is indigenous or alien. Rather, though the species does not yet qualify as **cultivated**, it is likely to be **cultivable**.

P. juliflora in India is therefore both an Invasive Alien and a Cultivable species. This duality apparently calls for a concern. Article 8(h) of the Convention on Biological Diversity (CBD), of which India is a contracting Party since 1994, directs that “*Each contracting Party shall, as far as possible and as appropriate, prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species*”. Cultivation of an alien species is thus incompatible with controlling and eradicating it. However, the large swaths of areas and ecosystems inhabited and inhabitable by *Prosopis* are not uniform, neither with respect to the ecosystem services degraded by *Prosopis*, nor with respect to those services it has already promoted and/or it is projected to promote. Since “ecosystem services” are benefits people derive from ecosystems, and since these benefits contribute to their well-being, it is proposed that depending on the ecosystems and depending on the people that depend on them, *Prosopis* would be treated either as an **invasive alien** species or as a **cultivable** one, and will be accordingly managed, to achieve either **eradication, control, or cultivation**.

Uriel Safriel emphasized and discussed where and how each of the three aforesaid management options will be applied?

- 1) **Eradication** will be applied where *Prosopis* is known to degrade ecosystem services that are major contributors to the human well-being of people that are already, or wish to depend on these services. It has been suggested that by now *Prosopis* is non-eradicable in India. But since this management is only to be applied locally, the issue may not be that daring as it sounds. A promising strategy may be directed to the seed dispersal agents (i.e. mainly livestock) rather than to the already established plant individuals. Even when directed to the latter, persistent removal of the above-ground parts will not only reduce fecundity but it also likely to eventually starve the root and its buds.
- 2) **Control** measures will be applied where *Prosopis* promotes ecosystem services that are of “strategic” contributors to human well-being. Recall that the *Prosopis* initial

introduction was driven by the concern of “desertification” and that indeed there seems to be support to the notion that at least in the original areas of introduction this species was successful in controlling soil erosion and may have even reduced soil salinization. Though these ecosystem services promoted by the introduced *Prosopis* did not directly support the people living in the planted area, they are contributing the human well-being at a spatial and socio-economic scale much larger than the local scale of the original introduction. Management for control needs to be worked out, such that the species in the areas of control will be maintained in an optimal density, with minimal negative impact on other ecosystem services, and will not invade other areas. A promising approach would be to study the species in its indigenous ecosystems, namely in Peru, in order to find out which are the natural agents controlling the species population in the ecosystems where it is indigenous.

- 3) **Cultivation** can be implemented in two levels. The species can be managed in the wild, for promoting those services of economic benefit. Some encouraging experiments in this direction have been already carried out in India, mainly by Central Arid Zone Research Institute (CAZRI), Jodhpur. Researchers from GUIDE also presented their findings in this regard, and discussed about the dependence of rural poor on *Prosopis* in this regard. The other level is that of plantations, that will target the different benefits, or services to be promoted. For example, the current controversy regarding the service of charcoal production can be resolved by allocating areas designated to plantations in which charcoal will be harvested in a sustainable manner, and those varieties of *Prosopis*, which have both the best quality of charcoal and the highest rate of its production, will be selected for these plantations. As presented and discussed by a research team from GUIDE and J. C. Tewari (CAZRI) focusing on the economic services of the species, in wild, rendered to the rural poor in Western Kachchh and Western Rajasthan, respectively, it is also envisaged that even local communities will prefer to grow *Prosopis* for firewood as a marketable crop, or purchase this firewood rather than gathering it in the wild. By and large *Prosopis* can be cultivated for energy production (charcoal, firewood, biofuel), for producing timber used in the construction and carpentry industries, for food, either consumed by livestock or by people (e.g., pods, seeds), for other products of the tree such as gums, as well as for honey and wax produced by bees that specialize on this tree in India. Many of the participants support this view and urge for promoting the same and also suggest to view *Prosopis* as an alternate source of energy and hence concepts like

Prosopis wood based gasifier need to be promoted to serve different energy requirement of the local mass especially rural poor.

Some of the specific issues which participants raised and discussed that need attention from the view point of managing the species are as below:

- Assessment of the national status of *Prosopis* should be known clearly before deciding on different management options. Significant gaps, especially on the status of *Prosopis* at national level could be noticed. Modern scientific tools like Geographical information system and Remote sensing (GIS & RS) could be appropriately used to get this national status as urged by A. K. Sharma (Space Application Centre, Ahmedabad) and G. Areendran (WWF-India, New Delhi). Special attention need to be given to states like Gujarat, Rajasthan, Tamil Nadu and Andhra Pradesh where spreading of *Prosopis* is intense.
- It is apparent that one blanket management option is not possible or practicable for *Prosopis* management as pointed out by C. P. Geevan (Centre for Environment and Social Concerns, Ahmedabad), whilst accentuating the 3-E Points of Reference (Ecology/ Environment, Economy and Equity) and emphasized upon the need for a holistic approach for *P. juliflora* management. Management options should be site/area/region specific preferably with stakeholders' participation. For this sound data on *Prosopis* economics and ecology is a pre-requisite. However, an acute shortage of researchers and institutions working on *Prosopis* is apparent. Research communities and ecologists should be galvanized to come up with credible data which could be used in its management and policy framework. A careful ecological and economic analysis should be carried out before deciding on the management of *Prosopis*. For example, eradication should be case specific and all pros and cons of eradication should be carefully analysed based on credible data in any ecosystems like Protected Areas since many avian fauna solely depend on *Prosopis* as a habitat of choice.
- For a viable management which will not compromise human wellbeing and livelihood option, reliable data is required to assess how much of services and benefits is received from *Prosopis*. Researchers working on *Prosopis* should identify gaps in research and efforts should be made to fill this gap. To achieve this, a proper co-

ordination between people working in social and natural science is important. An agenda spelling out different areas of integrated research is needed in this respect.

The final session witnessed brain storming deliberations, in which seasoned forest managers, researchers and policy makers participated and a consensus was brought out. Finally, it should be noted that a service of every tree, be it indigenous, alien, cultivated or planted, on top of all its services at the local level, is that of carbon sequestration. This is a service of global significance, yet can generate income for local people (through the carbon trading mechanisms) and it would boost the international image of the country as a whole. *Prosopis* of India, whether in areas it will be controlled or cultivated, will be default also provide this carbon sequestration service. Furthermore, there are cases, highlighted in the Symposium, where *Prosopis* supports local biodiversity components that are of global significance and some of the research findings were presented and discussed by N. Sheeba from SACON in this regard. This service of supporting unique biodiversity, not only constitute a cultural service to local people, and amenity service to the internal tourism industry, but has also significance at the international arena, due to the importance of some components of India's biodiversity at the global scale. Regarding these services of *Prosopis* of the country at both the national and the global scale, no specific management on top of the control and cultivation addressed above is required. However, it is incumbent on the authorities in the different levels to install a reliable, credible and committed long term monitoring and assessment system that targets the sequestered carbon by India's *Prosopis* at the local and national scale, as well as that of the relevant *Prosopis*' biodiversity-promoted components.