

Bridging the knowledge gap on a valuable tree

Validated RNRRS Output.

A project to bridge a critical information gap on the valuable mesquite tree, with inputs from 10 countries, has resulted in many valuable publications. These include a field guide, country-specific policy briefs on India, Ethiopia, South Africa, Sri Lanka, Kenya and Brazil, other briefs on the weed problem and global issues, and many journal and popular articles, as well as a video. Mesquite, *Prosopis juliflora*, is a common species in the world's hot, arid and semi-arid regions. It provides fuel, food, fodder, wood products (parquet floors, furniture, fence posts), and bee pasturage. However, in many parts of Asia and Africa it remains under-used, and is often regarded as an invasive weed. Over 18,000 copies of the publications were downloaded from the project website in 2006 alone; 70% of this demand was from sub-Saharan Africa and Southeast Asia.

Project Ref: **FRP05:**

Topic: **1. Improving Farmers Livelihoods: Better Crops, Systems & Pest Management**

Lead Organisation: **Henry Doubleday Research Association (HDRA), UK**

Source: **Forestry Research Programme**

Document Contents:

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Description

Research into Use

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Geographical regions included:

[Africa](#), [Asia](#), [India](#),
[Kenya](#), [South America](#),

Target Audiences for this content:

[Forest-dependent poor](#),

FRP05

A. Description of the research output(s)

1. Working title of output or cluster of outputs.

In addition, you are free to suggest a shorter more imaginative working title/acronym of 20 words or less.

Original working title (PMF, 1998):

Prosopis juliflora and related arboreal species: a monograph, extension manual and database. Incorporating project extensions on training/evaluation, production of a field guide and policy briefs.

Initial running title:

Prosopis: state of knowledge

Running titles in latter stages of the project:

“Management and utilisation of *Prosopis*”, or “the *Prosopis* project”.

Shorter/imaginative working title:

Enriching livelihoods in drylands, through improved management, utilisation and marketing of *Prosopis* - producing green products from greened deserts.

2. Name of relevant RNRRS Programme(s) commissioning supporting research and also indicate other funding sources, if applicable.

Forestry Research Programme

3. Provide relevant R numbers (and/or programme development/dissemination reference numbers covering supporting research) along with the institutional partners (with individual contact persons (if appropriate)) involved in the project activities. As with the question above, this is primarily to allow for the legacy of the RNRRS to be acknowledged during the RIUP activities.

R7295 (ZF0086)

Lead institute (1998-2006)

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4. Describe the RNRRS output or cluster of outputs being proposed and when was it produced? (max. 400 words). This requires a clear and concise description of the output(s) and the problem the output(s) aimed to address. Please incorporate and highlight (in bold) key words that would/could be used to select your output when held in a database.

Prosopis are now probably the most common trees in the hot arid and semi-arid zones of the world, and at least one in ten people dependent on wood for fuel is likely to rely on *Prosopis* as their main source. In the native range Americas, all parts of the tree are valued, supplying raw materials and supporting local trade in processed goods. During the last two centuries they were introduced into Africa, Asia and Australia for fuel and fodder, where, however, they remain largely unmanaged, under-utilised, and are today better known as invasive weeds rather than useful trees. Although there is wealth of literature on the species in a variety of languages, journals and conference proceedings, there was no global synthesis. Thus, the tree had been introduced, but the indigenous knowledge surrounding its wise management and use, had not.

The initial project purpose was to apply new knowledge to problems in forest and tree resource management, via the collation and dissemination of the current state of knowledge of *Prosopis juliflora* and related species, as (1) a scientific **Monograph**, (2) **Reference Database**, and (3) **Technical Manual** for India, all published in 2000-01. R7295 built on research already undertaken by project staff in other RNRRS projects (R4733, R5071 and JFS535).

Positive impacts led to the funding of project extensions to assist in taking this knowledge directly to specific countries and target groups, and to overcome some of the four key constraints to development identified in the Monograph, species mis-identification, poor management, little product processing/utilisation, and undeveloped marketing/commercialisation.

A training programme in 2001 saw over 100 trainees trained in **Management and Utilisation of *Prosopis juliflora*** in India. A practical **Field Guide, Identifying Tropical *Prosopis* Species** was commissioned in 2002 and published in 2004. Nine **Policy Briefs** were produced, a first series of three on global issues, the weed problem and a country-specific brief for **India** in 2002, a brief on project outputs and impacts in 2004, and a second series of country-specific briefs for **Ethiopia, South Africa, Sri Lanka, Kenya** and **Brazil** in 2005-06.

The project eventually ran for over seven years (1998-2006), producing 13 principal project outputs for £185,570, a video and other dissemination materials, and many additional journal and popular articles, with significant inputs from collaborators in ten countries. There were also 'spin-off' projects, e.g. on molecular taxonomy and biogeography, which fed results back in to latter R7295 outputs.

5. What is the type of output(s) being described here?

Please tick one or more of the following options.

Product	Technology	Service	Process or Methodology	Policy	Other Please specify
X	X	(X)	X	(X)	

6. What is the main commodity(ies) upon which the output(s) focussed? Could this output be applied to other commodities, if so, please comment

Being multi-purpose, *Prosopis* yields a wide range of products and associated commodities, though project outputs concentrated on those most commonly exploited to date and those having greatest potential for improving

rural livelihoods directly through value-addition and indirectly by ameliorating the natural environment:

- (1) *Prosopis* wood, for firewood, charcoal, posts, poles, and a sawn timber;
- (2) *Prosopis* pods, as a livestock feed and for making human foods; and,
- (3) environmental services provided by nitrogen fixation, shade, shelter, live and dead fencing, erosion control, soil improvement and reclamation.

Secondary products comprised: honey (as a bee forage), edible exudate gums, fibres, tannins, foliage for fodder, mulch, biopesticides and medicines, and other uses for wood and pods such as particle board, wood chips for energy generation, pods for ethanol production, galactomannan gums from the seeds and other specialist products.

7. What production system(s) does/could the output(s) focus upon?

Please tick one or more of the following options.

Leave blank if not applicable

Semi-Arid	High potential	Hillsides	Forest-Agriculture	Peri-urban	Land water	Tropical moist forest	Cross-cutting
X			X	(X)	(X)		

8. What farming system(s) does the output(s) focus upon?

Please tick one or more of the following options (see Annex B for definitions).

Leave blank if not applicable

Smallholder rainfed humid	Irrigated	Wetland rice based	Smallholder rainfed highland	Smallholder rainfed dry/cold	Dualistic	Coastal artisanal fishing
	(X)			X		

9. How could value be added to the output or additional constraints faced by poor people addressed by clustering this output with research outputs from other sources (RNRRS and non RNRRS)? (**max. 300 words**). Please specify what other outputs your output(s) could be clustered. At this point you should make reference to the circulated list of RNRRS outputs for which proformas are currently being prepared.

Prosopis has such a range of uses that outputs are used in diverse fields, e.g. rangeland management, food processing, etc. Livelihoods of poor people would be improved by clustering and applying R7295 outputs with country- and discipline-specific research related to *Prosopis* and its products.

ICRAF and other RNRRS projects identified similar poverty-related constraints to development with other agroforestry tree species, mainly product processing and marketing. ILRI also works on *Prosopis* for livestock feed and the Director General expressed willingness to share expertise (see Annex). Numerous national forestry and agricultural institutes such as KEFRI, Kenya, continue to link R7295 outputs with their on-going programmes. NGOs also working on *Prosopis*-related issues, e.g. FARM-Africa (Ethiopia) and Practical Action (Sudan) could use outputs in their own programmes to improve livelihoods.

Clustering with specific RNRRS research would add benefits. For timber, R8510 confirmed the value of chainsaw milling as an appropriate technology for processing small logs in drylands and agroforestry, and a training course conducted in Kenya in 2006 milled *Prosopis* (see <http://chainsaw.gwork.org>). Use of this technology was in part identified during R7295. As a human food, aflatoxins have been identified as a contaminant of poorly stored pods, and future work could draw from many projects that have researched this (R5898, R6091, R6127, R8125, R8296, R8483 and R7809). As an animal feed, other RNRRS project researchers were contacted, e.g. on the use of *Prosopis* pods as livestock feed and participatory development in India (R6933), and further benefits could be gained.

Increasing uptake by poverty groups could be achieved by adopting appropriate results from a range of extension-type projects (e.g. R8349, R8428, R8274, R8498), and the 'Wambui-model' (R7425) could be immediately applicable for selected target groups.

Validation

B. Validation of the research output(s)

10. How were the output(s) validated and who validated them?

Please provide brief description of method(s) used and consider application, replication, adaptation and/or adoption in the context of any partner organisation and user groups involved. In addressing the "who" component detail which group(s) did the validation e.g. end users, intermediary organisation, government department, aid organisation, private company etc... This section should also be used to detail, if applicable, to which social group, gender, income category the validation was applied and any increases in productivity observed during validation (max. 500 words).

The production of each output included a final, internal validation of potential effectiveness by the project team and collaborators, based on individual expertise. Collaborators also received in-country validity feedback on their respective outputs. The FRP external reviewer complemented the quality of R7295 outputs and potential impacts, the first Policy Briefs also used as models for other FRP projects to follow. No external impact assessment of project outputs was undertaken by DFID, however, validation may be assessed to some extent through proxy indicators relating to dissemination, training and application by intermediate and end users.

Positive reviews were published in several scientific journals, mostly for the Monograph, but also the Field Guide and the Reference Database. Validation is also seen by the number of citations, the Monograph now almost always cited in *Prosopis*-related articles. Larger reports and theses make extensive use of knowledge collated in the Monograph, and images and tables are used in presentations, even by established *Prosopis* researchers. Demand levels for project publications from HDRA serve as another proxy indicator. Electronic downloads of the Monograph, Technical Manual and the first three Policy Briefs combined, rose from 1,600 in 2004, to 5,040 in 2005, and a staggering 18,369 in 2006. Downloads of the Field Guide rose from 744 in 2005 to 1,104 in 2006.

The project team validated outputs with beneficiaries during project activities in India (2000-01) and in Kenya

during follow-up work (2006). Validatory feedback from Small and Medium Enterprises (SMEs) in Gujarat, India, included VM Dama (Hamlai Feeds, Bhuj), who purchases *Prosopis* pods from hundreds of local village households dependent on wild collection for an income. Evaluation of *Prosopis* wood instead of imported teak by a rural carpenter in Kutch, led within one year to his complete conversion to *Prosopis*, and with no need to buy timber he could send all his grandchildren to school. Also, Hardik Panchal (PDSPL, India) who is establishing a factory in Gujarat, commented: "Now our project is on the final stage of getting permission from Ministry of forest, central government, India. At present I am working on technical approval of *prosopis juliflora* for production of Medium and High density fibre boards. Your publications and research reports are helping me in each and every aspect of my project." (email 16/01/06).

In Kenya, promotion and informal validation of outputs occurred through a modest grant from the Kennington Overseas Aid trust, with new knowledge from R7295 applied by HDRA and KEFRI, aiming to promote the use and sale of *Prosopis* tree products. Two village communities of Marigat and Salabani were involved in training, adaptation and adoption activities, and project outputs enabled these beneficiaries to see *Prosopis* as a valuable resource for the first time. Foods containing *Prosopis* flour were made, logs milled (also using outputs from R8510), and the first outreach training saw women and men making and demonstrating human food uses and timber processing in Garissa and Tana River, to claims that this is "manna from heaven" and "a great potential for rural development".

11. *Where and when have the output(s) been validated?*

Please indicate the places(s) and country(ies), any particular social group targeted and also indicate in which production system and farming system, using the options provided in questions 7 and 8 respectively, above (max 300 words).

India was targeted early in the project, with publication of the Technical Manual, a series of training courses and production of a specific policy brief (2000-02). Local examples of validation in India are given above, and social groups targeted were the moderately and extremely vulnerable poor, the latter including assetless rural households, subsistence farmers and those living in disaster prone areas (droughts and earthquakes).

Of the country collaborators, follow up was made mostly with Kenya owing to substantial demand from KEFRI (Kenya Forestry Research Institute) for further information and technical support. This materialised as the management and commercialisation project in Baringo District described above. Here, social groups comprised mainly of pastoralists and subsistence farmers, women-headed households, indigenous people, and those living in remote areas. Continual demand for output validation from the Ethiopian collaborator is as yet unsatisfied, owing to insufficient resources of the project coordinator and HDRA.

Note that the project previously identified target groups as being: small-scale farmers, poor landless families, artisans, traders and small-scale entrepreneurs (Annex 2; DFID-FRP, 2000). Some of these groups, though not treated in the Hopley-Jones classification, provide direct benefits through the provision of employment, income through demand for raw materials or providing some other crucial link in any new product supply chain for *Prosopis*. Known also as 'the tree of the poor', *Prosopis* is one of the few high-potential local resources in dry areas for sustainably lifting the extreme vulnerable poor out of poverty.

In both regions, the production systems targeted were predominantly semi-arid zones, *Prosopis* being well adapted to such environments, the forest-agriculture interface, and where present to peri-urban areas and the land-water interface. Within these, the farming systems targeted were largely smallholder rainfed (dry) including nomadic and settled pastoralists as well as farmers, and irrigated land where *Prosopis* can also be common.

Current Situation

C. Current situation

12. How and by whom are the outputs currently being used? Please give a brief description (max. 250 words).

Outputs are freely accessible through HDRA in hard copy or from the website www.gardenorganic.org.uk/international_programme/ip_publications.php (except the Reference Database), and are advertised in newsletters and other media targeting smallholder farmers and the research and policy sectors. Monitoring shows that outputs are requested largely from NGOs, CBOs, research and government departments. Country-specific outputs are also disseminated by project collaborators through their own networks and contacts.

Forestry and agricultural researchers and extensionists in Africa, Asia and Latin America provide feedback to HDRA on the use of outputs in assisting and supporting their activities on the ground. Policy shakers use this knowledge to push for policy changes where constraints to development are identified, e.g. articles in *Biocontrol News and Information* (27(2), 2006) on *Prosopis* invasions in Kenya and Ethiopia, cited the respective Policy Briefs and Monograph, concluding that utilisation, not eradication, was required.

Researchers use outputs to assist in defining their own strategic priorities, in preparing literature reviews, presentations and publications. Extensionists and especially livestock specialists, are now much more likely to adopt management and utilisation of *Prosopis* as a strategy to turn this invasive species into a productive resource. They use information in the outputs to tailor target group-specific extension materials, to purchase appropriate equipment and provide suitable advice.

SMEs also provide feedback on use of outputs to guide business possibilities and help establish novel products and/or processing techniques or technologies. Of crucial value is their application in semi-arid regions where investment potential is generally limited.

13. Where are the outputs currently being used? As with Question 11 please indicate place(s) and countries where the outputs are being used (max. 250 words).

Based on HDRA's monitoring feedback for 2005, just over 70% of the demand for written outputs comes from sub-Saharan Africa and South-East Asia (though there is currently no specific country breakdown online). Through the networks of project collaborators, 500 copies of each of the six country-specific Policy Briefs have been distributed in Brazil, Ethiopia, India, Kenya, South Africa and Sri Lanka.

Large numbers of outputs have also been disseminated during visits to India and Kenya by the project

coordinator. In Kenya and other parts of East Africa, outputs are proving particularly important in the on-going debate around what to do with large-scale invasions of *Prosopis juliflora*. In 2006, two visits by the project coordinator confirmed that the Monograph, Kenya Policy Brief, the Field Guide to identify the sparse but superior *P. pallida* trees, and experience from the Indian training courses, are proving especially useful.

Through these media, individuals or institutes in almost all countries having hot or warm arid or semi-arid zones have received some of the project outputs, as well as researchers in Europe, North America and Australia. Use is highest in countries where English is widely understood (see 17, with the exception of the Brazil Policy Brief, in Portuguese). In these countries, knowledge from the outputs is being used largely in the semi-arid zones, whether in pastoral, rainfed or irrigated agricultural areas.

14. What is the scale of current use? Indicating how quickly use was established and whether usage is still spreading (max 250 words).

Demand for all outputs continues to increase. For each, 1000 copies were published, of which approximately half were sent out immediately via initial mailshots, including collaborators' in-country dissemination networks for country-specific Policy Briefs. Outputs (except the Reference Database) were web-enabled by 2004 and subsequent outputs made available on-line immediately following publication. As already noted (see 10), combined electronic downloads of the Monograph, Technical Manual and first three Policy Briefs (series 1) was 1,600 in 2004, 5,040 in 2005 and 18,369 in 2006. Downloads of the Field Guide numbered 744 in 2005, and 1,104 in 2006.

A breakdown of download figures for 2006 give the following: Monograph - 9,761; Technical Manual - 3,516; Policy Briefs series 1 (combined) - 5,092, Policy Briefs (series 2, given individually), Sri Lanka - 838, South Africa - 795, Brazil - 725, Ethiopia - 388, and Kenya - 218. Monthly figures are also increasing, e.g. with the Monograph, from an average of 1,170/month in the first quarter, to 1,695/month in the third quarter. No breakdown of downloads by geographical region is possible, however, but are supported by citations of the Monograph from all over the world. There is no indication of a levelling or decreasing trend in written requests for printed publication or downloads of any of the project outputs.

However, evidence of practical application of output recommendations by beneficiary groups is limited, and appears to be only beginning, mostly in regions where HDRA has promoted these, as described above (see 11 and 12).

15. In your experience what programmes, platforms, policy, institutional structures exist that have assisted with the promotion and/or adoption of the output(s) proposed here and in terms of capacity strengthening what do you see as the key facts of success? (max 350 words).

As well as output dissemination and promotion mechanisms directly activated by the project team and collaborators, as described above, DFID identified regional offices requiring copies of the original R7295 outputs, and funded project extensions to increase uptake of findings, notably the Indian training programme and publication of Policy Briefs. Other, cost-effective means of output promotion have included the publishing of reviews and related papers in scientific journals (e.g. Forest Ecology and Management), and the use of listservs and electronic newsletters, the increasing numbers of the latter offering further potential for 'free' promotion in the

future.

In terms of putting research into use, experience has shown national and regional research and development institutes to be effective. On the other hand, international organisations, notably ICRAF and to a lesser extent FAO, who had agreed to promote project outputs, were able to make only a more modest contribution to dissemination.

A key identified factor for success was a sense of ownership of the outputs, such as seen with the country-specific Policy Briefs, and an already existing institutional mandate, e.g. agroforestry, arid lands, invasive species, etc. KEFRI, for example, is playing an important role in the dissemination and application of outputs for adoption and/or adaptation in rural areas containing *Prosopis* in Kenya. Crucial in this case is the policy influence of KEFRI in enabling beneficiary groups' access to harvest *Prosopis* on government land and to legally trade charcoal. Amongst beneficiary groups, key factors for success in India and Kenya were the local abundance of *Prosopis*, the interest in new income-generating or food-providing opportunities, high existing levels of timber usage, the existence of organised groups, and the proximity of potential markets or the ability to access more distant markets.

Whether the need is to demonstrate food uses of *Prosopis* pods, mix complete livestock rations, chainsaw milling logs, or tree pruning and thinning, it was clear that the training of trainers is required so intermediate users can effectively promote and disseminate this knowledge to end users. Thus, key to achieving this was the presence of project staff to assist in building capacity during initial training courses.

Current Promotion

D. Current promotion/uptake pathways

16. Where is promotion currently taking place? Please indicate for each country specified detail what promotion is taking place, by whom and indicate the scale of current promotion (max 200 words).

Output promotion continues through HDRA and project collaborators (see Section C). HDRA continues to receive requests for outputs from all over the world, and internet downloads continue at an increasing rate (see 14). The five country-specific policy briefs produced in the past 18 months are still being disseminated by in-country collaborators, supplemented by internet downloads. The project coordinator also continues to respond to requests for further information, largely from East Africa and India, and the Kenyan collaborator is also known to be promoting outputs. What is currently occurring in other targeted countries is uncertain, however, although the Ethiopia Policy Brief has been cited in a number of publications received by project staff.

Promotion of the practical application of R7295 outputs has only occurred in India during the project, and in Kenya during follow-up work. In Kenya, a small grant from Kennington Overseas Aid enabled promotion in Baringo District, alongside an FAO pilot project, and following promising results, the Government of Kenya gave further limited funding for outreach training and demonstration in 2006-07, for Turkana, Garissa and Tana River Districts. This is due to end in June 2007, but would provide a valuable platform on which to base a future

programme.

17. What are the current barriers preventing or slowing the adoption of the output(s)? Cover here institutional issues, those relating to policy, marketing, infrastructure, social exclusion etc. (max 200 words).

A major policy barrier has been the drive by some governments, national and international organisations to promote eradication of invasive *Prosopis*, including use of biological control, possibly due to previous investment in such research, and/or the desire for a 'quick fix' to gain political favour amongst beneficiary groups. Based on experience in Kenya, policy barriers also include tenure, tribal relations and historical issues.

From project experience, institutional barriers include lack of funds and know-how for following-up outputs with participatory training, extension and outreach programmes with beneficiary groups. Capacity building of intermediate and end-users is required, also in marketing capacity, the only one of the four constraints identified in the Monograph not addressed in project extensions. In particular, a complete lack of skills in chainsawing/sawmilling is identified in semi-arid areas, to be overcome if timber is to become an output from drylands, though this capacity is lacking in many national forestry institutes.

All but one of the project outputs were published in English only, and are, for example, less commonly used in Francophone Sahelian Africa (pers. comm., Eric Grosso, ex-SOS Sahel International, 2004). Downloading the larger outputs from the HDRA website has also been a barrier to their wider usage.

18. What changes are needed to remove/reduce these barriers to adoption? This section could be used to identify perceived capacity related issues (max 200 words).

In terms of printed outputs, a second edition of the Monograph is required, possibly translated, or at least further Policy Briefs in French and Arabic would reach others not yet aware of project outputs. All outputs should be available on a single CD-ROM to increase dissemination cost-effectiveness.

Policy makers must accept the link between *Prosopis* utilisation and poverty alleviation, and *Prosopis* – 'the tree of the poor' - needs to become a political issue to the advantage of the poor rather than to research institutes or governments. An effective way to encourage change is for policy makers to see the benefits first-hand, possibly arranged by DFID country or regional offices. This attitude change then needs to be followed by policy changes related to land access, tenure, exploitation and trade amongst others.

The capacity of national and regional institutes in related and applied skills must also be improved, and the ability to roll out training-of-trainers courses to nationwide programmes reaching the CBO and NGO level.

Building the capacity for regional cooperation and collaboration would serve to encourage exchange of experience, knowledge and solutions, e.g. between the East African countries of Kenya, Ethiopia and Sudan which all have the same 'problem' of *Prosopis* invasion.

19. What lessons have you learnt about the best ways to get the outputs used by the largest number of poor people? (max 300 words).

'Seeing is believing', as Indians involved in the 2001 training so often commented. This was supported by reactions of beneficiaries in Kenya, who also rapidly adapted techniques after seeing demonstrations of making food and sawing timber. Participatory experimentation by the beneficiary groups, in the presence of extension, research and policy stakeholders, opened the door for spontaneous adaptation and adoption in both Gujarat, India in 2001 and Baringo, Kenya in 2006.

During a training course in Kenya in February 2006, for example, *Prosopis* flour was mixed with wheat flour to make chapatis for the first time, as Kenyans had until then considered *Prosopis* harmful to health. After the project coordinator ate the first chapati, trainees also tasted and enjoyed them, and proceeded to make a range of foods during the day, with the concept now adopted locally and with a women's group formed to train women in other areas. Similarly with the wood, when a tree was felled and boards were cut on site with a chainsaw mill, trainees were amazed at the timber quality and the speed of turning trees to timber. Foresters and other officials present were clearly convinced, seen in their comments to journalists afterwards. Flour was taken to the local hotel and prepared and served to guests, with the chef and staff very impressed.

In addition, having committed partners and collaborators who have helped develop, and believe completely in, the solutions being recommended, and those with strong regional networks, have proved to be very important. This allows for much additional impact, by more dissemination via personal and 'chance' meetings and through the local media by attracting journalists, and from infrastructural support via the use of vehicles, equipment and technical staff. This also enables the linking of outputs to existing training courses as well as creating new programmes.

Impacts On Poverty

E. Impacts on poverty to date

20. Where have impact studies on poverty in relation to this output or cluster of outputs taken place?

Longer term impact studies were not written into the project, and no specific studies assessing the impacts of R7295 outputs have been conducted to date, to the knowledge of the project coordinator. Written outputs and in particular the country Policy Briefs have only recently been produced, so practical impact would as yet be difficult to assess. Beneficiary impact as described in previous sections has been ascertained only through project training activities in India, and through the 2006 Kenya follow-up project.

However, a DFID reviewer noted "Strong impact markers (for the country-specific R7295 policy briefs) except in Kenya where the government agencies were still inclined to treat *Prosopis* spp. as weeds to be eradicated rather than as a resource to be managed for fodder and fuel" (see circulated list of FRP outputs). Nevertheless, in Kenya, impacts of the brief (published only in January 2006) and follow-up work during this year are already being seen.

Due to the emerging threat of *Prosopis* as an invasive species in Kenya, studies have been and are being undertaken there on costs and benefits of *Prosopis* invasion on local populations. These studies indicate the

potential impacts that may result from further work on developing *Prosopis* as a resource, and could provide valuable baseline data for assessing future impacts in Kenya.

Simon Choge (co-author of the R7295 Kenya Policy Brief) and colleagues at KEFRI produced a landmark report in 2002, 'The status and impact of *Prosopis* in Kenya'. This analysed costs in monetary terms from invaded districts all over the country, from livestock deaths, destruction of fishing nets, crop losses, costs of removal, costs for medicines and even for repairing punctured bicycle tyres resulting from damage by thorns. Detailed surveys assessed positive and negative perceptions, including 12% of respondents who noted *Prosopis* thickets as a 'refuge for thieves'. In conclusion, the benefits from current uses for firewood, fodder, charcoal and poles outweighed the costs, but it was observed that perceptions were shifting, and unless immediate action was taken to control *Prosopis* and promote its sustainable management and use, costs may soon exceed benefits.

A more recent case study in a single district was undertaken by Esther Mwangi and Brent Swallow of ICRAF, 'Invasion of *Prosopis juliflora* and local livelihoods: case study from the Lake Baringo area, Kenya' (ICRAF Working Paper No. 3, 2005. www.worldagroforestry.org/units/Library/books/pdfs/WRKP%203-%20Mwangi.pdf). A very detailed analysis of impacts on local livelihoods, it concluded that costs outweighed benefits in five of the seven villages surveyed, though this varied depending on the main livelihood activity in each. The importance of outputs from R7295 were noted and the conclusions summarised (page 52), noting that "Calculated learning and borrowing from India's (i.e. examples from R7295) efforts will not only increase the range of options for dealing with the menace of *Prosopis*, but will also likely depress the costs of investment in basic research".

On-going studies in Kenya include the MPhil research of Joan Sang (assisted by KEFRI) on the impact of *Prosopis* on poverty, focusing on household income and expenditure. A report entitled 'Putting new knowledge on *Prosopis* into use in Kenya - pioneering advances in 2006' (see Annex) also provides further data, some quantitative, on very recent financial benefits accruing to local communities and potential benefits in the coming years.

21. *Based on the evidence in the studies listed above, for each country detail how the poor have benefited from the application and/or adoption of the output(s) (max. 500 words):*

- *What positive impacts on livelihoods have been recorded and over what time period have these impacts been observed? These impacts should be recorded against the capital assets (human, social, natural, physical and, financial) of the livelihoods framework;*
- *For whom i.e. which type of person (gender, poverty group (see glossary for definitions) has there been a positive impact;*
- *Indicate the number of people who have realised a positive impact on their livelihood;*
- *using whatever appropriate indicator was used detail what was the average percentage increase recorded*

It is exceedingly difficult to assess exact numbers of people affected and percentage increases with such an information-type project. The numbers of outputs disseminated and downloaded through project R7295 have been quantified, but not the numbers of people affected by this transfer of knowledge. The impact studies identified above looked at the current impacts of *Prosopis* on livelihoods in situations where there is little knowledge on its potential, rather than the impacts of applying project outputs and recommendations.

Thus this section focuses on recent action to apply project outputs, the KOA funded project in 2006. This project

directly worked with approximately 60 beneficiary households in two communities with a combined total population of approximately 8000. Social groups comprised mainly of pastoralists and subsistence farmers, including women-headed households, indigenous people, located in remote areas. Estimated livelihood impacts occurring during this project life (from December 2005 to December 2006) are presented below (and detailed in the Annex).

- Human assets have been improved by training a total of 34 trainees (including 19 women) in Baringo in February, and training and demonstration to over 100 more by November, in *Prosopis* tree management, food uses, sawmilling and wood use in carpentry.
- Social assets were improved after the lifting of policies constraining charcoal production and trade on some trial plots of land, to be extended when a complete lifting of this ban for *Prosopis* charcoal is expected next year.
- Natural assets have been improved by at least 30 households now managing *Prosopis* on their own land, increasing production of tree products and improving the growth of understory vegetation.
- Physical assets are being improved by the adoption and adaptation of knowledge on how to make human foods from the pod flour, improving family nutrition and saving money.
- Financial assets have been improved from two sales of collected pods in 2006, one for export to South Africa for dietary supplements, the other to a livestock feed manufacturer in Nairobi. These first two orders (23 tonnes total) directly injected over £1000 into two rural communities in Baringo, from private companies, giving all people, especially women, the opportunity to earn money by collecting pods, even the landless.

A further order for 40 tonnes is confirmed for early 2007, with possible orders for confirmation of 100-200 t/yr for export and at least 1500 t/yr nationally. These benefits followed inputs from a committed KEFRI researcher and the R7295 project coordinator, in just over a year, with institutional support but minimal funding.

This indicates that a concerted effort will make substantially larger improvements in rural poverty across the spectrum of capital assets, especially improved financial assets by income generation, and improved natural assets by reducing invasions, as collecting, removing and/or milling one tonne of pods destroys some two million seeds.

By scaling up training and outreach, significant improvements in rural livelihoods can be achieved nationally, such as in Kenya, regionally as in East Africa, continent-wide or pan-tropically, based on this evidence from Kenya in 2006.

Environmental Impact

H. Environmental impact

24. What are the direct and indirect environmental benefits related to the output(s) and their outcome(s)? (max 300 words)

This could include direct benefits from the application of the technology or policy action with local governments or multinational agencies to create environmentally sound policies or programmes. Any supporting and appropriate

evidence can be provided in the form of an annex.

Environmental benefits of well-managed *Prosopis* woodlands are numerous. Most importantly, soil fertility is improved and erosion controlled, through shade, shelter, nitrogen-fixation and leaf-fall. *Prosopis* also reclaims highly alkaline and saline soils such as found in poorly managed irrigation schemes, and can be used as a pioneer species in a succession strategy for reclaiming desert soils for productive use. Project outputs promote such ecologically-adapted management. As experienced during field work in Kenya, *Prosopis* stands also contribute greatly to the control of desert dust storms.

Indirectly, the promotion of sustainable timber production from drylands will reduce the demand from remaining natural forests (see outputs from R8510), thus helping in their conservation. This was again experienced in Kenya, where one carpenter said he would now stop purchasing (illegally harvested) hardwood and switch to using local *Prosopis* instead.

Controlling *Prosopis* also helps to reverse the negative environmental impacts experienced in many countries from invasions, caused by the formation of impenetrable thickets, suppression of native vegetation and changes in natural processes, especially in National Parks or other protected areas.

Control and/or eradication of invasive species is required under Article 8(h) of the Convention on Biological Diversity, and *Prosopis* is the most important invasive species in three East African countries, Kenya, Ethiopia and Sudan. The Monograph concluded, however, that total eradication is not possible, but that promoting *Prosopis* utilisation will control spread and also improve rural livelihoods. Utilisation also avoids the extensive use of herbicides, risks associated with biocontrol introductions, or high costs of these or mechanical means that would otherwise be used in eradication programmes. 'Control through utilisation' was also the key message identified by in-country collaborators in all of the six countries for which the specific Policy Briefs were produced. Their respective titles are indicative, and suggested actions contained in each confirm this.

25. Are there any adverse environmental impacts related to the output(s) and their outcome(s)? (max 100 words)

The outputs and outcomes focus on the wise management of already existing trees. The Indian Technical Manual promotes planting of *Prosopis* in areas where knowledge is available on its management and uses, and all the Policy Briefs detail the environmental benefits achievable by controlling *Prosopis* (see 24).

This is in contrast to previous introduction and planting programmes of exotic *Prosopis* species by national and international agencies which have caused invasions in many countries. *Prosopis juliflora* is declared a noxious weed in several countries, e.g. Australia, South Africa, Sudan and Ethiopia, where laws require land-owners to remove *Prosopis* plants.

26. Do the outputs increase the capacity of poor people to cope with the effects of climate change, reduce the risks of natural disasters and increase their resilience? (max 200 words)

Prosopis stands stabilise soil and prevent erosion. As a drought-hardy tree, they provide fuel and fodder even in the driest years, and can play a very important role in sustaining human nutrition in drylands across the world, especially for the extremely vulnerable poor and refugees. In their native range, *Prosopis* stands were treated as

sacred for their role in sustaining Amerindian tribes during the dry season. Transferring this knowledge to where the trees are introduced could reduce levels of malnutrition and even save people from starvation.

In the 2005-06 drought in Kenya, Ethiopia and Somalia, people went hungry even though the pods from *Prosopis* trees littered the ground in many areas, due to a belief that they were inedible. When the timber is commercialised, *Prosopis* trees may also serve as 'saving banks', as other timber species do in more humid regions, and can be sold to provide income when it is most needed, such as for school fees, marriages or funerals, or if the harvest fails or livestock die of disease. Collection and sale of honey and exudate gum (equivalent to gum arabic) can also provide additional livelihood improvements even during droughts.

Annex

Putting Knowledge on *Prosopis* into Use in Kenya

Click below to view the related information

[PF_FRP05_Annex.pdf](#)
