



Wells for India

Bringing water and dignity
to the poorest people of rural Rajasthan

20 Years Growth and Survival of Trees in the Dry Lands of Rajasthan:

Has Wells for India made a significant difference?

This paper asks a question about the role that Wells for India has played over the past 20 years in the planting of trees and the impact towards improving life in the dry lands of Rajasthan and whether it is a sustainable and beneficial project through our 'Trees for Life' activity? Have we really made a difference?

Wells for India aims to restore the environmental balance by providing the villagers with indigenous trees which have many uses such as providing nutritional fruits as well as herbal medicines and pesticides. At the request of villagers in Rajasthan, we aim to support people towards a self-sustaining healthy life and to provide income generation. We achieve this through our 'Trees for Life' program and holistic projects and the work of our NGO partners.

Before we look at our projects, I would like to introduce you to a little history as to why there has been so much de-forestation. We may think it is inappropriate behaviour by people living in the desert but many laws have changed the possession of forests and pastureland from government to powerful landowners and between different tribes therefore marginalising many people, who previously owned the land, and their opportunity to benefit from it.

In about 1400 legend has it that a young boy (Jam ba Jee) Jambaji laid down certain rules about nature. From these grew the values of the Bishnoi tribe who have become the environmentalists of Rajasthan. Several stories are told about women losing their lives to protect trees during the centuries but I suppose the most famous is that of Amrita Devi and 363 women who were killed in 1730 by the orders of Marharaja Abhay Singh of Jodhpur who wanted the trees to fire his lime kilns to build his beautiful palace. The villagers attempted to resist felling of trees by hugging and encircling them but lost their lives in doing so. He eventually saw sense – but too late! The Bishnois tribe are the surviving sect who retain an environmentalist ethos today and are the precedents of the Chipko Movement in contemporary India.

The Bishnois tribe have some interesting theories about ecology and perhaps Wells for India should look towards their knowledge as an indicator for the future, especially in the 21st century as the global green, organic, eco-friendly movement develops and Governments collaborate towards G8 strategies? The Times of India in May 2007 stated that Central Government is interested to cover 33% of land by forestry by 2012. Let's hope they do and more.

Over many years the elite classes of India have contributed to de-forestation. During wars Teak has been needed for building boats. When railways were constructed, teak and other wood was needed for sleepers. Ironically many sleepers were left to rot. Before coalmines were in operation wood was used to power the trains.

Systematic logging by the East India Company and the British, for trade and profit caused great swaths of deforestation. We have some interesting old maps that document forest areas which are no longer there. The hills around Udaipur, for instance, which had been covered by jungle were denuded, the trees having been sold to the charcoal contractors of the British. Large areas of oak forests which were traditionally used to provide leaves for fodder and branches for fuel were felled to accommodate the more profitable Pine tree used for turpentine, a short term business.

Even as late as 1980 there has been conflict about the use of trees in India between women and men, when the men of one village wanted to exchange a whole community forest for a package of village improvements from the Government. But the women realized that the loss of trees meant more weary hiking in search of their daily necessities. When asked which trees are wanted, men say fruit because it can be sold as a cash crop and women say fodder and fuel trees. There is a distinction between men's

trees for cash and women's trees to provide day to day living which indirectly contributes to milk, fertilizer, nutrition, rope, medicines and seeds, seeing the long term benefit. ^

The shortage of wood is now so severe that animal dung is used for fuel, restricting its traditional use as a fertilizer and causing many health problems such as bronchitis. Several of us have seen the evidence of this.

As you can imagine the impact of this deforestation was and remains tremendous. In the Earth Summit of 1997 the UN identified the Thar Desert region as a major concern of desert encroachment and recently the United Nations declared 2006 as the year of the desert. We can therefore surmise that trees and forestry have an important part to play in the amelioration of environmental conditions in the semi arid and arid lands in Rajasthan and that it can make a significant contribution to the welfare of the people living in the desert areas.

So why should we plant trees now and why do we have a specific 'Trees for Life' programme? As you can see, there are several significant reasons. But most importantly it provides soil stability and water retention. We must put into context that, within Wells for India – a water based charity - tree plantation is only one aspect of the holistic project approach. Within the 'Trees for Life' aspect there are four programmes in which Wells for India supports change in Rajasthan.

- Horticulture and establishing orchard units.
- Tree plantations with pastureland development
- Trees on sloping lands
- Trees for schools and training projects

The first area of concern is horticulture and orchard units which are vital for the poorest communities as there is a great need to improve people's diet, particularly with vitamins. The people in the desert struggle against all odds. When I was in India this year a mother told me her family only ate Maize chapattis and a few chillies. She and her children looked ill and very anaemic! Therefore we can see that family orchards play an important role in maintaining the balance of the eco-system – plants: animals: and consequently human life.

Research from (CAZRA) The Centre of Arid Zone Research based at Jodhpur has identified fruit trees that grow well in desert conditions. This research is supported by HDRA and many other studies. Those high in vitamin c are Ber, Gunda, and Amla trees.

One area in which we are involved, is Pabupura. In 2003 The Pabupura Field Centre was opened and In 2006, GRAVIS our partner, planted 50 horticulture units. Each Horticulture Unit providing 16 saplings. I have been to Pabupura several years ago and have never seen trees growing like this!

This pomegranate photographed in January 2007 has thrived under extreme harsh conditions, having been tended with great care and patience by the family.

One of the most nutritious fruits, very high in Vit. C is the Amla tree. Amla – (Phyllanthus emblica) is a citrus fruit of medium size, is also called the Indian Gooseberry. The dried fruit is used in Ayurvedic medicine for various ailments like fever, liver disorders, indigestion, anaemia, heart complaints and urinary problems. Because it is a rich source of vitamin C it is a major component of Chavyanprash a popular Ayurvedic tonic. Raw Amla fruit is used for making pickle and preserves. Amla has been regarded as a sacred tree. It is sometimes called Lakshmi's tree because she is the Goddess of prosperity, the sustainer, and worshipped as 'Mother Earth.

The Bordi tree or Ber is like a plum . Wells for India has provided for the planting of many of these trees in family orchards. Perhaps you can recognise some of the other plants here; aubergine, castor oil, papaya all seen on the Pani Yatra in January this year.

Also in Pabupura 20 people from 4 villages have been given 5 different varieties of horticulture trees again including desert plum, citrus fruit, pomegranate, and lemons. Beneficiaries have contributed themselves by using home made manure and natural pesticides which is the key behind achieving a high rate of surviving plants. Families have also erected fences, made from thorn bushes around the plantation areas to safeguard the plants from animals.

Wells for India has provided for families to acquire saplings, equipment such as watering cans, hoes and the education and training required to protect and grow these trees. A fodder bank near the Pabupura field centre has been constructed for usage during times of acute shortage and four seed banks have also been constructed.

In 2005 five different varieties of trees such as desert plum, citrus fruit, pomegranate, and lemon were also planted in the horticulture unit established in Narayanpura village. Beneficiaries have contributed by using their home made manure and pesticides.

With the establishment of small orchards family diets have improved and there is also a possibility of income generation because it may provide a cash crop. Examples of this success are two stories about two women, Meher Khatun and Jethi Devi.

Meher Khatun, of Bap Village has a family of 13 (3 sons, 3 daughters in law, 1 daughter and 4 grandchildren). In her horticulture unit there are 20 fruit trees. These trees are of *Gunda*, *Anwala*, Pomegranate, Lemon. She has a personal taanka and she has also had installed a drip irrigation system in her unit. Because of the surety of water the trees in her garden show a high survival rate and even pomegranate trees have started yielding fruits.

Jethi Devi lives with her family of 16 members in a small Kuchcha hut in one corner of Pabupura. She became associated with the Trees for Life project after she was selected by the Village development committee to be a stakeholder; as an owner of a gunda unit.

She owned a taanka which was an added assurance to the GRAVIS team that the trees would not go without water. But it was also the degree of interest shown by this family and their genuine efforts in keeping the plants alive which ultimately led them to use Jethi Devi's unit as an experimental plot for drip irrigation by means of pitchers. After four months it seems to be a success story. Fifteen out of her sixteen plants have survived the harsh summer. That is a survival rate of approximately 94%.

"Earlier we had to water the plants everyday but after installing the pitchers we only have to do so once a week even during the summer" says Jethi Devi. Moreover due to the constant moisture in the soil the instances of termite attacks have also decreased.

Her Gunda unit will start yielding fruits after three years when the trees mature but Jethi Devi's efforts have not gone unnoticed. She has inspired many a families in this desert to adopt these trees. There are also many other examples I could tell you about. However there are many challenges for the villagers in the desert which we mustn't forget.

Our second area of development is tree plantations and pastureland development. Much of the land in Rajasthan is wasteland often due to over grazing and lack of water. Evidence has shown that by fencing and enclosing land, grasses and trees grow rapidly. Even Teak trees, which have deep and widespread roots that may have been dormant for 50 years, have come to life. Enclosing land has been a difficult concept for villagers because they fear the loss of communal grazing and it has taken some effort by our partners to encourage and show examples that in the long run the benefits outweigh the initial loss. It has taken determination by villagers and Women's Self Help Groups to persuade every family to keep their animals off the land. It took 2 years of persuading Chapariya village to enclose their land and when they eventually did, several thousand trees began to grow. From anecdotal evidence and empirical research there are several important trees which survive in drylands.

The Gunda is an important deciduous tree grown in the desert. It is used for fodder and timber and for making charcoal. Generally it is grown for making pickles and apparently is good for worms! The human kind!

Wells for India has provided for large forests of Gunda trees at Jaambi. This Community Forest also has about 56 bordi (Ber – Indian Jojoba) trees this tree gives the fruit Ber, It is an evergreen and is good for fodder but most importantly very high in Vitamin C. There are 52 trees of kair, 3 khejdi trees, 430 kumatia trees and 1300 trees of babool (acacia). Babool (acacia) holds a reputed position in all most all systems of medicine in India. According to Ayurveda, bark is hot, astringent to bowels, (alexipharmic, anthelmintic,) and useful in treatment of cough, bronchitis, diarrhoea, dysentery, biliousness, burning sensation, piles, leucoderma, urinary discharges, ascites etc. Leaves are beneficial for eye diseases whereas pods are considered as cooling. styptic and cures leprosy, vaginal and uterine discharges. Leaves are tonic to brain and liver and antipyretic. It is useful in treatment of leucoderma, gonorrhoea, blood discharges etc.

Babool Gum, known as Gum Arabic in the trade, is anti-dysenteric, is considered as an expectorant, liver tonic and antipyretic. Gum is also used in the treatment of sore throat, lung troubles, cough, piles, burns, blood disorders, colic etc. The bark and roots are used for sore mouth, body pains (Katha a white substance) bronchial asthma and indigestion. Cancer, piles and eczema and is a natural fungicide. Perhaps we get the name bubble gum from this tree?

The Babool is also known as *Acacia catechu* and *Acacia nilotica* -Khair or Kutch Tree. It is a moderate sized deciduous tree and belongs to the Legum inoseae-mimoseae family. It is used to make rice pestles; rollers for crushing sugar cane; ploughs; handles for knives; construction of houses; furniture; wheels and as railway sleepers and fence-posts. It is highly valued as fodder and fuel wood and as a barrier to desertification. It is also good for tanning and dyeing (catechin).

The flowers apparently, are good for insanity. Perhaps I should have taken some before agreeing to do this talk! As far as I know it is not used as food but can obviously be used for health medicine.

The trees in the Jaamba (God of the Bishnois) forest are now about 10 ft tall. The babool trees, have become big and are prominent and give the look of a true planted forest. Research suggests that Babool regenerates easily in the desert, Tolerates extremes of temperature -1 degree to 50degrees C. It is shade intolerant and the long thorns protect it from severe grazing. Other trees are surviving well. kair trees are smaller but give a lush green appearance to the trees. The khejdi trees have also started flowering, fruit pods of which are used as vegetables by the villagers. During January to March about 20 tankers of water have been used to water the plants. There is a watchman to look after the forest.

Tree plantations at Bhalu are also a success story. Trying to grow trees on sand dunes could be seen as a foolish idea but with regular watering for 3 years the trees have grown and survived. The trees are between 3 to 8 ft high. Ninety percent of trees are on plain land and 10% of the plantation is on sand dunes. In the Bhalu Community Forest there are over 3000 trees alive at present. The forest was initially watered 3 times in 2004. Sixteen tankers of water, each tanker of 5000 litre capacity, were used each time for watering. A guard was also present from sunrise to sunset to protect the forest from stray animals.

There was a proposal from the village community to cut and sell the grass, but the VDC (village development committee) members were of the opinion that the grass should be left so that the seeds from the grass could fall and increase the density of the grass in the coming years.

Also within the Thar desert project the community forest at Ghantiyali (gan ti ali) has over 5000 trees of Babool, Bordi (Ber), Kair, and khejdi. The forest has had a good growth of grass last year, which after drying has been used as manure for the trees. The trees have been looked after by watering with about 25 -30 tankers of water during January to March. Most of the trees are green due to the watering and natural manure. The forest is again looked after by a watchman, who waters the plants, gives manure and insecticides besides protecting them from stray animals.

And in the Ogna, Wakal project, 50 hectares of common pastureland is protected through staggered contour trenches and sowing of locally available grass seeds and trees. This increases the fodder and fuel wood availability in the villages.

Seven villages in the Pabupura cluster are participating in the Naranyanpura Pastureland Development which began in 2006. The leader of this project is Somari a woman (an achievement in itself). 8.5 hectares of land has been fenced off and 2700 trees planted with about half surviving. A guard has been employed to protect the forest.

The amazing indigenous Khejdi tree has been planted there. I remember some years ago having a lesson by Shashi Tyagi about the Khejdi tree and her telling me what a versatile tree it was. How it is wonderful for the desert. That it provides a shaded canopy and the leaves that fall provide a fertiliser to enrich the soil. That every part of the tree is used, for vegetables and fruit, leaves for fodder, wood for fuel and is able to germinate in the most difficult conditions.

It is said that, agriculture in Asian lands must "fit the land" (J Russell Smith (Tree Crops – A Permanent Agriculture. 1929) said in 1929 that" that this is a basic concept.)

One tree that 'fits the Land' and is among the most valuable resources in the dry lands of the world is *Prosopis cineraria* or Khejri tree which is by far the most widespread species in the hot arid and semi-arid zones of the world, (*Prosopis Cineraria*) Khejri is the most important tree species in Agro-forestry, providing livelihood support in the Thar desert. It is the State Tree of Rajasthan. Wells for India does plant these trees but they are natural seeders and some people have even described them as weeds!

Dr Phil Harris from HDRA says “Cineraria is one of the few Old World species of Prosopis” and has been the mainstay of the local economy for thousands of years because it tolerates incredibly dry conditions, especially in Northern India. It is used for Well construction; fodder; house building, doors, posts, fences and fuel. The pods are rich in protein for both livestock and humans. Pods are cooked and used as a vegetable and the honey is of the highest quality,

An old saying quotes ‘Death will not visit a man, even at the time of famine, if he has a Prosopis cineraria, a goat and a camel, since the three together are said to sustain a man even under the most trying conditions.’

The third area for tree development is on the SLOPING HILLS In the Aravelli Hills. Trees can be established on high slopes and great effort has been done by the villagers to build contour-trenches, gully plugs and check dams. Trees and grasses planted in the contour trench provide a barrier which helps water to percolate into the ground. It also stops erosion and silt flowing down the hillside. Plugging gullies and building check dams helps crops and trees to flourish.

Nala which is the name for a stream, is a village in the Aravelli Hills, our partners RBKS provide the impetus to implement the construction of (252) gully plugs and contour-trenching to hold back the monsoon water and reclaim agricultural land. Support from Wfl has included technical knowledge on dam construction, planting trees in semi-arid zones, water well maintenance and crop and field bund development.

In 2007 we saw that the land has been transformed with the valley now fertile where 24 wells have been regenerated and 116 families benefiting from 2 crops (maize and wheat) a year plus mustard, ginger and brinjal, plus others such as chilli, mango, guava and fruit trees.

Case study: Mr Himaji from Nala – Said his life has been transformed. He does not have to migrate, his living standard had improved and he can now buy clothes, and has a diet of rice and vegetables.

Trees for schools is the fourth aspect in our Trees for Life programme. As a holistic approach Wells for India encourages desert schools to plant trees, where the students can take responsibility and have training about water. This is a developing area in which I feel we could do a lot more.

None of our activities could be fulfilled without the dedication, the knowledge and unstinting inspiration of all our Indian partners. Therefore our current activities in the UK are to raise funds for financially supporting them to buy saplings, to encourage villagers to grow their own fruit, an important measure in fighting malnutrition. To provide education on watering and recycling water and equipment for weeding such as hoes and watering-cans. Provide measures that protect trees such as simple fencing and encourage communities to understand and share a common philosophy to persuade every family to keep their animals off agricultural land. Support the digging of ditches so that a contour trench will help collect water to support saplings and grasses. Build gully plugs and small check-dams to help trees and crops to flourish. Employ guards to prevent animal and human damage. Build small water tanklies supplying water for forests.

We have relied on local culture and knowledge by preserving native indigenous species. We have supported empirical evidence from India and around the world on the ‘best fit’ of trees appropriate to Rajasthan. Through our partners we have provided technical knowledge and encouraged the use of traditional ways always supporting local involvement in the implementation of all Trees’ for Life projects.

But perhaps we could do better by exploring ethno forestry, the protection of sacred trees. Sacred trees symbolize an array of human conditions and possibilities. They are worshipped as manifestations of Gods, stars, planets and symbols of natural energy elements such as water and land. Religious trees shape human actions and give meaning to these actions, we mustn’t forget it!

We must also recognize agro forestry and the important traditional methods of horticulture; direct sowing; rhizome planting; cuttings; and nursing wildings This sounds lovely and it means ‘nursing the bird-dropping sprouts.’ These trees can be a source of fodder, fuel, fruit, fibre and timber. ^

Perhaps we could do better by encouraging more careers in agro forestry for young people of the Thar and Aravellis? Perhaps we could do better by encouraging new biomass technology or reduce our carbon footprint by not travelling to India?

We could encourage and plant more school trees. We could pay more attention to our advertising for the funding of more trees and the management of them. We could be more aware of the difficulties the people

in Rajasthan have to endure and not make too many assumptions and have too many expectations. These are their trees, they have traditional but sometimes forgotten knowledge but with the constant encouragement from local NGO's the people of Rajasthan have achieved so much. They live in harsh conditions often forgotten by Government - We need to continually sustain them.

In the Hindu religion, the banyan tree is considered sacred. (and is called "Ashwath Vriksha" "I am a Banyan tree among trees" - Bhagavad Gita). It represents eternal life because of its seemingly ever-expanding branches and often called the 'wish fulfilling tree'. My wish would be that for all those people who wish to have a tree or an orchard in Rajasthan that they will have one and that it will flourish and that forests will grow.

I have described Wfl's involvement and painted a picture of hard toil and harsh conditions for the people in Rajasthan. Om Prakash told me that a woman had said to him that, "Nurturing a tree in the Thar Desert is harder than raising a child." Another woman (Bhanwari Devi from Kolu Pabuji) said, "We take care of our garden just like the way we take care of our children." It is therefore foolish to romanticise the achievements of afforestation by the continual and invaluable presence of our partners because there are many threats to these plantations. I personally think we have made a difference but I ask you the question, "Have we made a significant difference and can we do better in the future?" I suggest that our 'Trees for Life' programme is a strategy for life.

Research:

Anurag Gupta 2007 Conserving forest and trees in arid and semi-arid tract. (Pandey 1993)

Carter J 2004 *Acacia nilotica*: A tree legume out of control. In Forage Tree Legumes in Tropical Agriculture (CAB International Wallingford UK)

Fagg C 2001 *Acacia nilotica* : Pioneer for dry lands: Agroforestry Species and Technologies (Arizona USA)

^ Stein Burton. 1998. A History of India. Blackwell Press. P393

Ref: Henry Doubleday Research Association – National Organic Annual Report 1990. www.hdra.org.uk

M.S. Sandison: P.J.C. Harris, HDRA. *Proposis Cineraria – A Multipurpose Tree for Arid Areas*. Coventry and Udaipur.

G.V. Jacks: R.O. Whyte. *The Rape of the Earth :A World Survey of Soil Erosion*. Faber and Faber London 1939

J Russell-Smith 1929 *Tree Crops-A Permanent Agriculture*. Press Classics.

Chils .J., Chamberlain J.R., Antwi E.A., Daniel J., Harris P.J.C. 2001. *Improvement of Neem and its Potential Benefits to Poor Farmers*. HDRA, Coventry, UK. ISBN 0 905343 29 8. 32p.

Childs F.J. and Chamberlain J.R. 2000. *Neem in the Community*. Training leaflets. HDRA, Coventry, UK. PhilHarris

Angela Huggett-Willis 2007