A step towards

RESTORATION OF FOREST

on a private land

PLANNED & EXECUTED BY,

oikos

for Ecological Services

Where

At post : Wan Kusawade, Taluka : Patan, Dist : Satara

Owners of the land

Atul & Geetanjali Kulkarni
Nitin & Suniti Kulkarni
Dhiresh & Snehal Joshi

Planned & Executed by

oikos for ecological services, Pune

Context for the project

- All natural systems, be it forest, river, lake, are degrading very fast from its original structure.
- Reason is man made interventions in natural areas or even life style of urban people, indirectly affecting the environment.
- One of the way to conserve these systems is RESTORATION !
- Present project gives an idea about restoration of forests in Western Ghats.
- Aim of this project is to restore the natural systems and biodiversity, for future generations.

Why conservation perspective ?

- Urban citizens who buy land at countryside, are not dependant on the land for their livelihood. They buy land just for the sake of enjoyment. So conservation of biodiversity is the best perspective to look at it.
- Urban life style being most consumptive and being responsible for degradation, restoration and conservation of natural systems is one way to give back to nature ! … which should be considered as our 'responsibility' ! ... for our own future generations !!!

Location


INDIA
Maharashtra
Mumbai
Pune
Nashik
Nagpur
Surat
Ahmedabad
Rajkot
Vadodara
Hyderabad
Visakhapatnam
Bangalore
Chennai
Coimbatore
Madurai
Goa
Karnataka
Tamil Nadu
Kerala
Andhra Pradesh
Orissa
Chhattisgarh
Jharkhand
West Bengal
Bihar
Rajasthan
Gujarat
Punjab
Haryana
Uttarakhand
Himachal Pradesh
Jammu and Kashmir
New Delhi
Lucknow
Kanpur
Jaipur
Ludhiana
Chandigarh
Lahore
Faisalabad
Multan
Islamabad
Kabul
Karachi
Sikkim
Bhutan
Assam
Meghalaya
Nagaland
Manipur
Tripura
Mizoram
Arunachal Pradesh
Sri Lanka
Bay of Bengal
Andaman Sea
Madhya Pradesh
Ujjayini
Indore
Vadodara
Surat
Nashik
Aurangabad
Maharashtra
Nagpur
Amravati
Akola
Wardha
Gondia
Raipur
Durg
Yawal Wildlife Sanctuary
Ruyyadi
Parnaka
Kalyan
Pune
Satara
Solapur
Sangli
Kolhapur
Karimnagar
Warangal
Hyderabad
Khammam
Vijayawada
Rajahmundry
Kakinada
Andhra
Narayanpur
Jagdalpur
Gadchiroli Range
Alluri Sitaramaraju Forest Area
Azadnagar
Satara
Shivajisagar Lake
Urmodi Project
Koyana Backwaters
Janai Malai
Shendre Fata
Nagthane
Ali
Murud
Murud Road
Pali Rd
Wan kusawade
Wind Power Plant

Regional setting of the project area

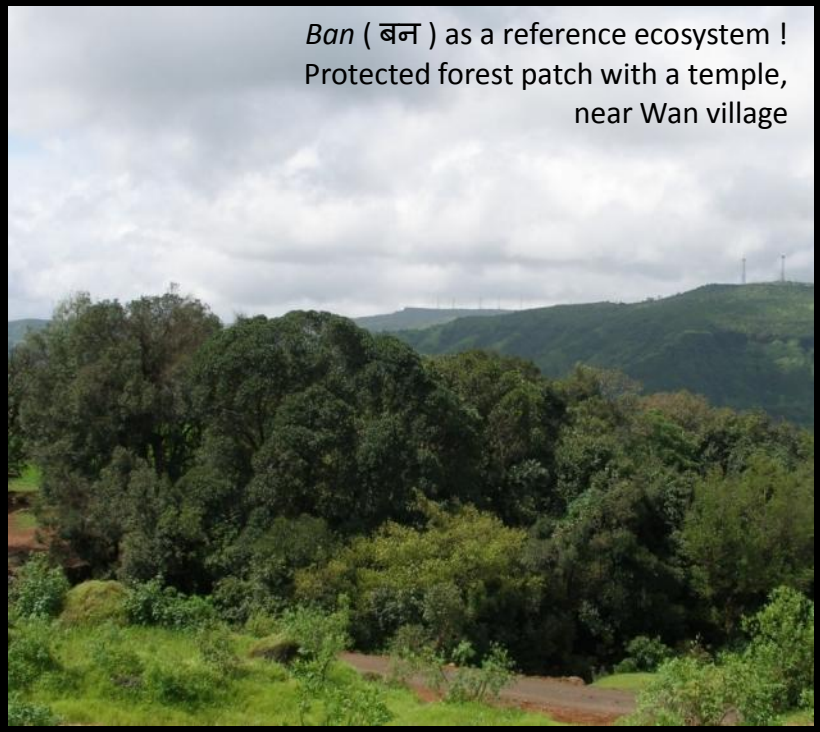
- Part of Sahyadri i.e Western Ghats, very near to Koyna wildlife sanctuary & proposed Sahyadri Tiger Project.
- Average elevation 1012 m above sea level.
- Heavy rainfall around 5000 mm av. annual, high speed winds, hilly topography.

About project land

- Total area : 24 acres
- Initial status in 2005 :
  - Open grassland to scrub
  - Lack of canopy
  - Poor fertility of soil
  - Intense grazing
  - High speed wind

Arriving at the aim

- The year round Ecological Assessment of project land and surrounding, concluded that project land should have experienced “Tropical semi-evergreen type of forest”, which is now degraded to “Open scrub lands”. An effect of years of interventions by local people, like cultivation, cutting, & grazing.



Ban (बन) as a reference ecosystem ! Protected forest patch with a temple, near Wan village

- So it is decided to restore this area back to its original state of forest.

Long term objective

- It is well understood that creation of forest on a barren land can't be achieved in one or two years. It might take many years from 20 to 50…
- So it was decided to set the land on right track towards restoration of forest ecosystem suitable to climate and rainfall.
- There are various stages to reach the ultimate stage. This presentation shows how the first step is achieved.

Initial status of project land

- Absence of organic matter in soil, no moisture holding capacity. Water vanishing very fast after heavy monsoon & winter, after January.
- Very less vegetation. Pressures from cutting, grazing, cultivation. Shrubs clusters present. Has potential to grow into dense evergreen forests.
- Very little faunal diversity. Presence of passing leopard.

Restoration techniques

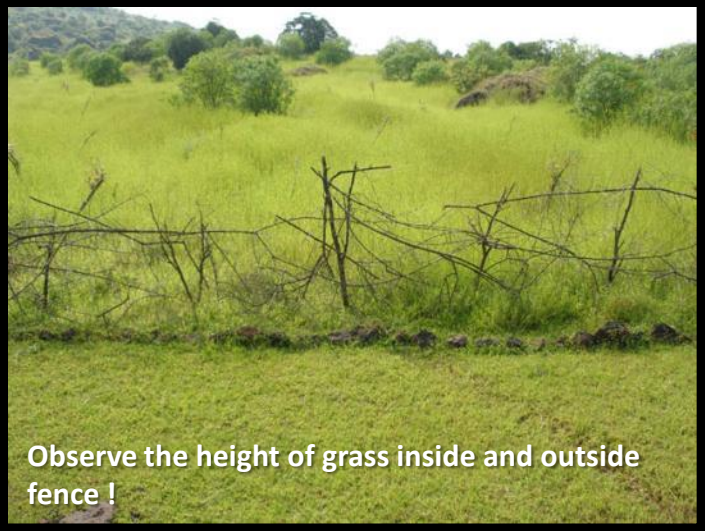
- **Protection** : by thorn compound. Combined with stumps of Nirgudi, Pipar, Bhoma, Bamani to form a thick live hedge eventually.
- **Control on Wood cutting, Grazing & Grass cutting**
- **Soil and Water Conservation Measures** : Making 100 sq ft round seasonal ponds for increasing percolation & moisture holding capacity. These pond boundaries are lined with round local stones & karvi planted on bunds. Stone lines as & wherever necessary
- **Stream Restoration** : Loose boulder bunds on stream.
- **Plantation of Native plants** : Planting 200 to 250 plants of native species including shrubs, climbers per year.

RESTORATION TECHNIQUES AND RESULTS

Protection

- Improvement in biomass production
- Insulation of grass cover for soil throughout the year
- Increase in Regeneration
- Habitats are created for smaller fauna

Dry fence and Live hedge



Fire line

- A belt of 10 to 15 feet width is put on controlled fire. This is to avoid fire to enter the project area.

Soil & moisture conservation

- Soil gets accumulated behind bund
- Seed bank is arrested and germination starts

Stone lines

Soil & moisture conservation

Gully plugging - Loose boulder bunds

Moisture conservation

- More percolation
- Increased soil moisture
- Riparian zone gets recharged

Ponds & Stream bunds

Site specific changes in landscape

Year 1

Year 2

Stone bunding at specific location helps in soil erosion control and local vegetation development

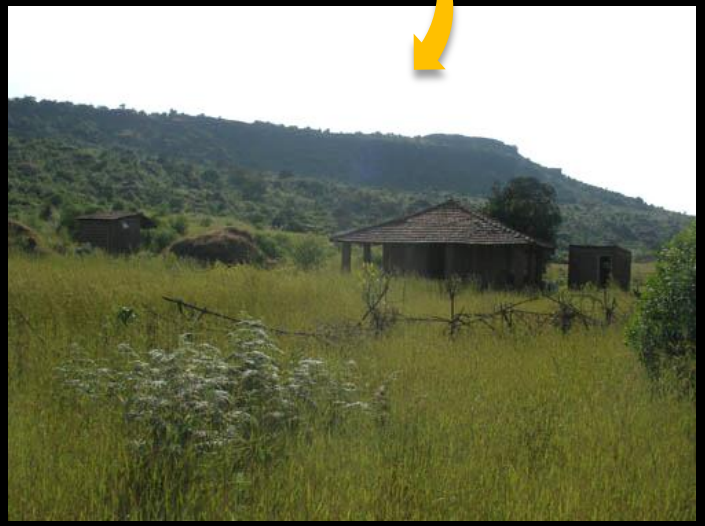
Year 4

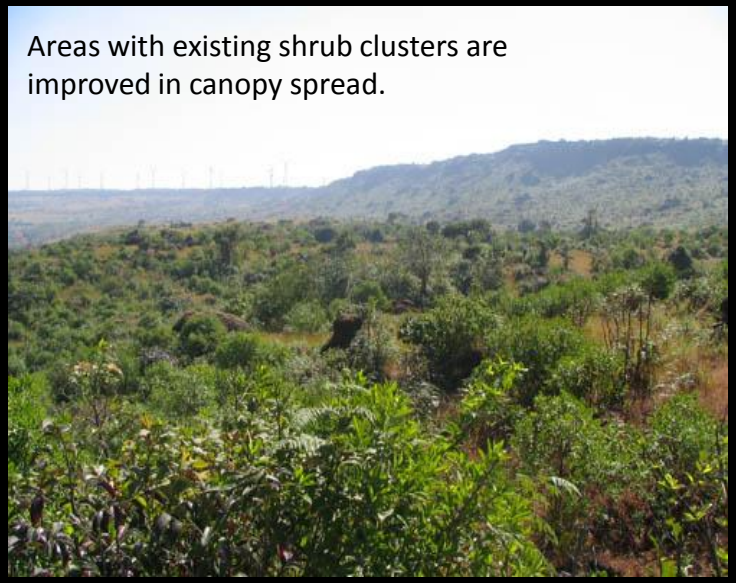
Year 6

Observe the height of human figure w r t eroded surface and conserved soil layer !

Local vegetation development

- Perennial Grass development
- Growth in Clusters
- Change in species from drought resistant species to moisture demanding species





Native Plantation

- Main focus is not plantation but improving ideal conditions for self regeneration and plantations. So instead of mass plantations on entire land, around 100 to 250 native plants are planted every year.
- Total species planted till 2012 = 1200
- Diverse species - Hardy to Special as per habitat & grasses to trees
- Fast & slow growing
- Grass mulching to each plant
- Protection from wind & sun as required.

Monitoring growth of the saplings

No	Name	Quantity		No	Name	Quantity
1	Bija	1		26	Pipar	5
2	Kalam	1		27	Shikekai	5
3	Kalumbar	1		28	Ain	9
4	Pedgul	1		29	Bharangi	10
5	Samudra ashok	1		30	Lodhra	10
6	Sheras	1		31	Murudsheng	10
7	Shendari	1		32	Newali	10
8	Dhup	2		33	Wet	10
9	Bahawa	2		34	Kinjal	12
10	Gela	2		35	Ambulaki	4
11	Goyanda	2		36	Anjani	18
12	Kuda	2		37	Raikuda	20
13	Madhavi lata	2		38	Parjambhul	22
14	Satwin	2		39	Maad	25
15	Surangi	2		40	Bakul	40
16	Makadi	3		41	Phanas	60
17	Phansada	3		42	Beheda	100
18	Ranchafa	3		43	Pisa	100
19	Bhokar	4		44	Shivan	100
20	Kala kuda	4		45	Hirda	104
21	Kewada	4		46	Amba	110
22	Kumbha	4		47	Kokam	110
23	Wari karvi	4		48	Bamboo	120
24	Kusar	5		49	Jambhul	121
25	Nagchafa	5			Total	1209

- Focus is to plant the species from existing forest composition in the surroundings. So thrust is given on : Mango – Jamun – Hirda – Beheda – Pisa

Few fast growing varieties, recorded in 4th year, w r t human scale.

Seed dispersal

- Seed dispersal was done in existing vegetation clusters, which gave fantastic results without watering.
- Seeds used for species – Mango, Jamun, Karwand, Dingala, *Wenlandia* etc.

Seeds of Mango, *Mangifera indica*

Seeds of *Dingala, Crotolaria spectabilis*

Regeneration of sapling from seed

Improved habitats

Micro habitats in terms of shrub clusters, ponds, grass clumps are providing habitats for micro fauna and flora.

Improved soil temperatures in Summer

Open soil temperature : Max. 56 ^{0} c

Covered soil temperature : Max. 44 ^{0} c

Indicators

- Number of insect species and population has improved.
- Occurrence of snakes is altogether new record indicating improved moisture.
- Increase in population of leeches

Watering need decreased considerably !

MONSOON : COMPARATIVE IMAGES

Year 1

First monsoon with seasonal grasses

Year 3

Increased biomass with regenerating shrub clusters

SUMMER : COMPARATIVE IMAGES

Year 1

Barren landscape with scanty grasses

Year 4

Increase in perennial grasses

Year 6

Current state with increased shrub canopy and dominance of perennial grasses

Social benefits

From an area of 24 acres

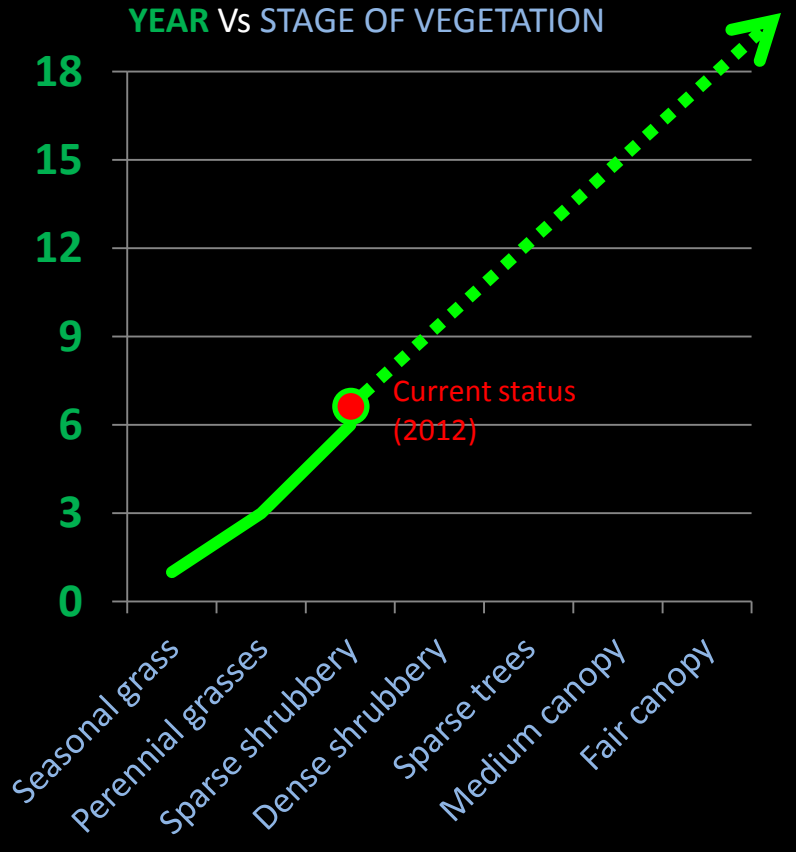
- Employment to a local person as full time worker on land (@ Rs. 45,000 per year)
- Employment to local people in restoration as & when required (@ Rs. 15,000 average per year)
- Availability of good quality grass for local cattle (bunches)
- Rough estimation - around 105 kg of quality grass from 1 *guntha* i.e. 1000 sq. ft.

To summarise results,

- Increase in soil moisture, organic matter & fertility
- Improved Growth rate of planted trees
- Reduction in External inputs – lesser watering need
- Improved Micro habitat development – flora n fauna
- Increase in shrubs & clusters
- Increase in number & extent of leeches and other fauna – birds, spiders, snakes

- These results show that the project is on right track towards restoration of forest.
- Within six years landscape is changed from seasonal grassy cover type to perennial sparse grassy and shrubby cover types.
- Though it is difficult to calculate exact time period of this restoration, it is predicted that, within next six years, dense shrubbery with sparse tree cover can be achieved.

Graph showing succession on the land and prediction of the same in future :



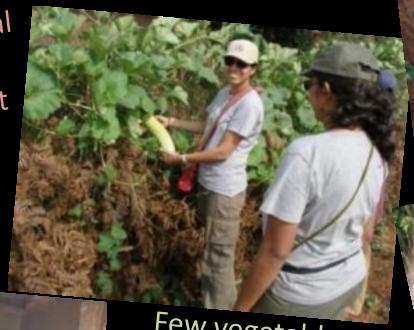
Thank You !

AS OWNERS SAY : “ As urbanites, its responsibility of land owners to initiate such projects as ‘cautious citizens’. ”

रानमेवा !!

Enjoying post monsoon !

Kisan, Local person working at site



Few vegetables grown on land !

Stone work !

Interaction with local people

A walk during monsoon !

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