



National Initiative For Revitalizing Indian Rivers For Sustainable Agricultural Development Through Buffer Zone Afforestation

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&

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नदी अभियान कृषि कल्याण

- Water security : Revive our rivers, and replenish our aquifers
- Livelihood assurance : Nurture the farmers who nourish us - double their income
- Food security : Ensuring sustainable agricultural practices

RALLY FOR RIVERS

INDIA'S LIFELINES

- **Initiated by Sadhguru**
- **30 day awareness campaign with 146 events across 16 states in Sep 2017**
- **Unprecedented support from 160 million people**
- **Supported by 16 Chief Ministers across the political spectrum**
- **MOUs have now been between states and Isha Foundation:**

**Maharashtra, Karnataka,
Punjab, Gujarat,
Chattisgarh, Assam**



River Revitalization proposal submitted to the Union government

- Prime Minister notifies an expert group under the CEO of Niti Aayog
- Members include:
 - Secretary Agriculture, Cooperation, Farmer Welfare
 - Secretary Water Resources, River Development, Ganga Rejuvenation
 - Secretary Environment, Forests, Climate
 - Secretary Drinking water, sanitation
 - Secretary Rural Development
 - Secretary Housing, Urban Affairs

First meeting with RFR Board held on Nov 24, 2017



Draft policy recommendation for the revitalisation of India's rivers in the able hands of our Prime Minister. Looking forward to ecologically sensitive and economically beneficial policy.

Sadhguru

UN's Sustainable Development Goals (SDG) 2030

'Leaving No One Behind'

Revitalization of Rivers will help India to achieve:

- **SDG 6 (Clean Water & Sanitation)**
- **SDG 15 (Life on Land)**
- **SDG13 (Climate Action)**

It will also impact significantly

- **SDG 1 (Poverty)**
- **SDG 2 (Zero Hunger)**
- **SDG 3 (Good Health & Well being)**
- **SDG 8 (Recent work & Economic Growth)**
- **SDG 9 (Industry, Innovation & Infrastructure)**
- **SDG 10 (Reduce Inequality)**
- **SDG 11 (Sustainable Cities & Communities)**
- **SDG 12 (Sustainable Production & Consumption)**

Our dying rivers

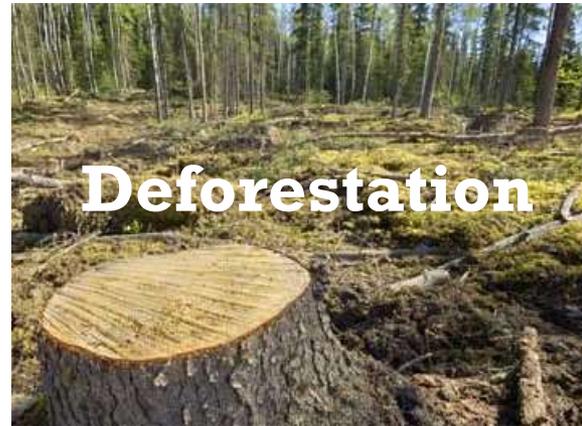


Perennial rivers are turning seasonal; many tributaries have vanished

Dramatic decline in just 70 years

Ganga: (44) %
Narmada: (58) %
Krishna: (61) %
Kaveri: (39) %
Godavari: Dry at source in 2016

Major Causes for Water Depletion

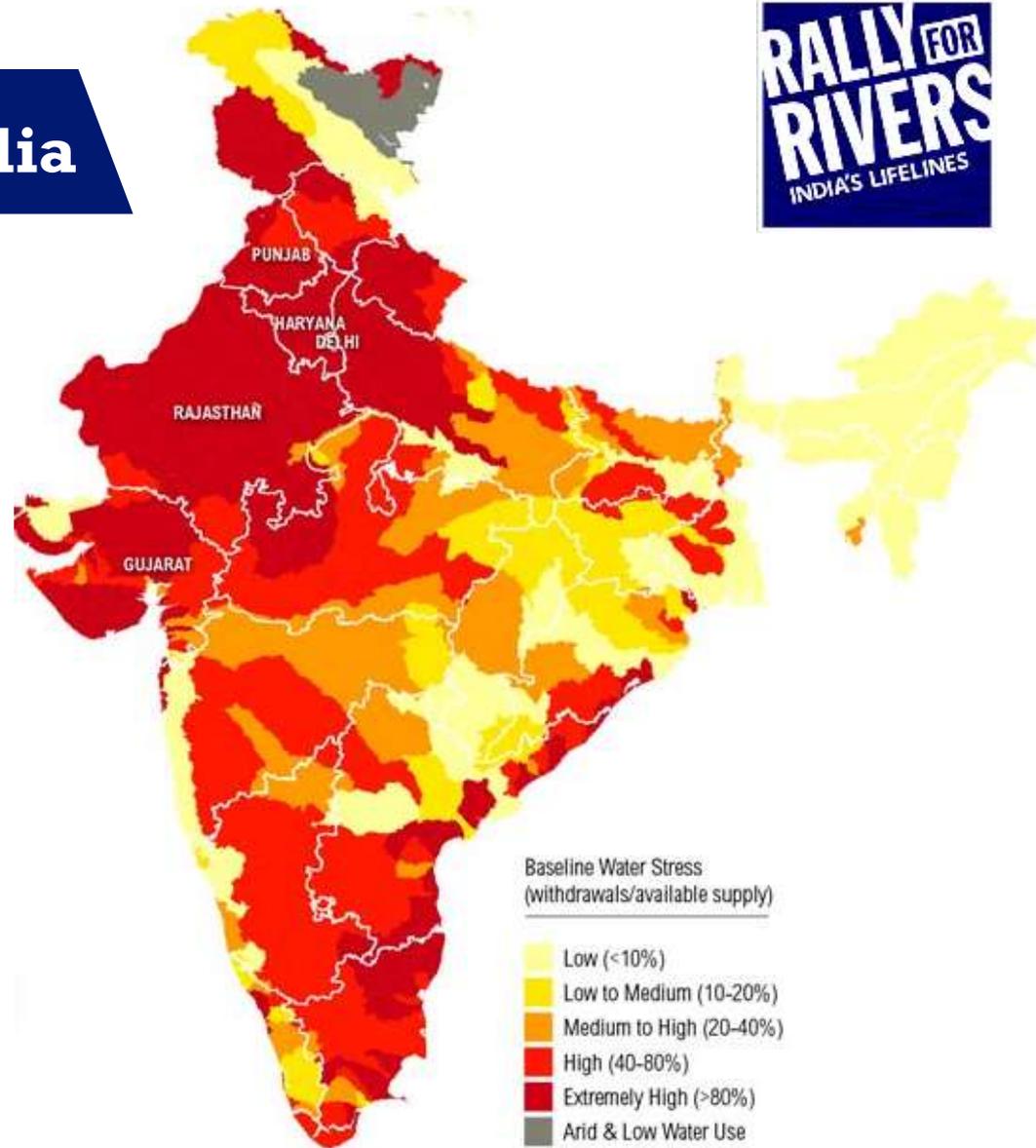


Facts about Water in India

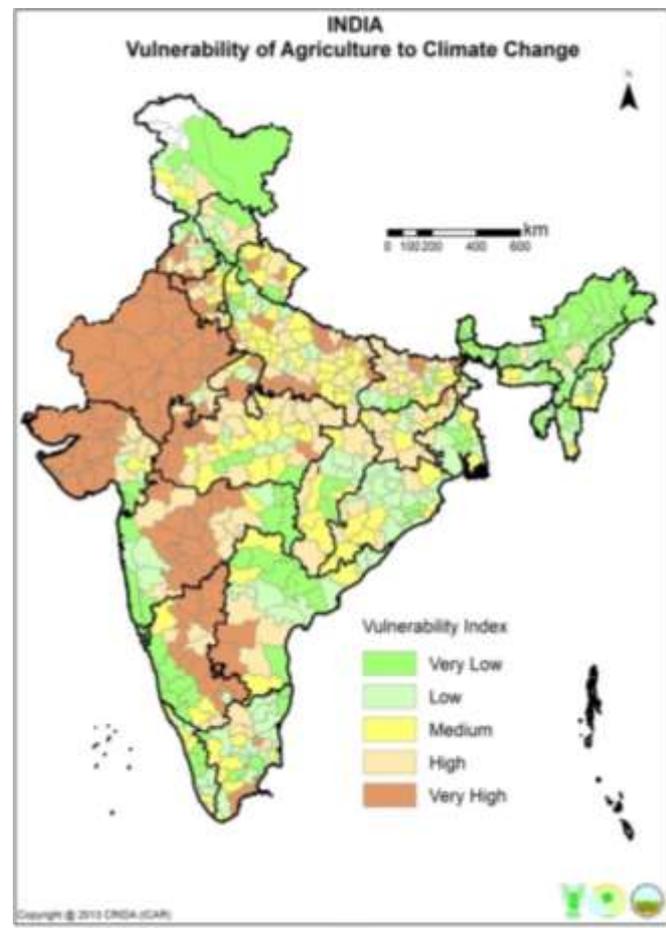
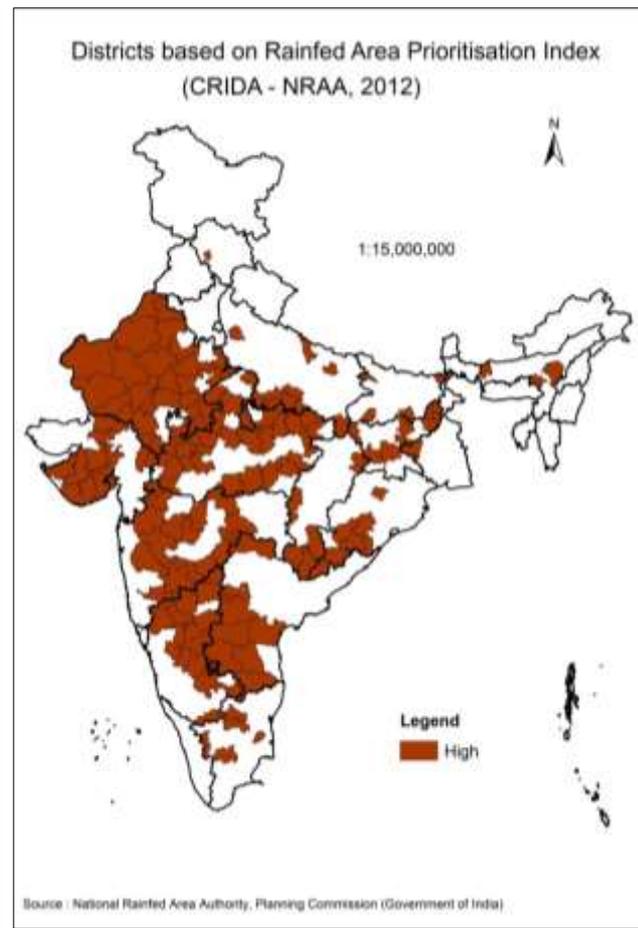
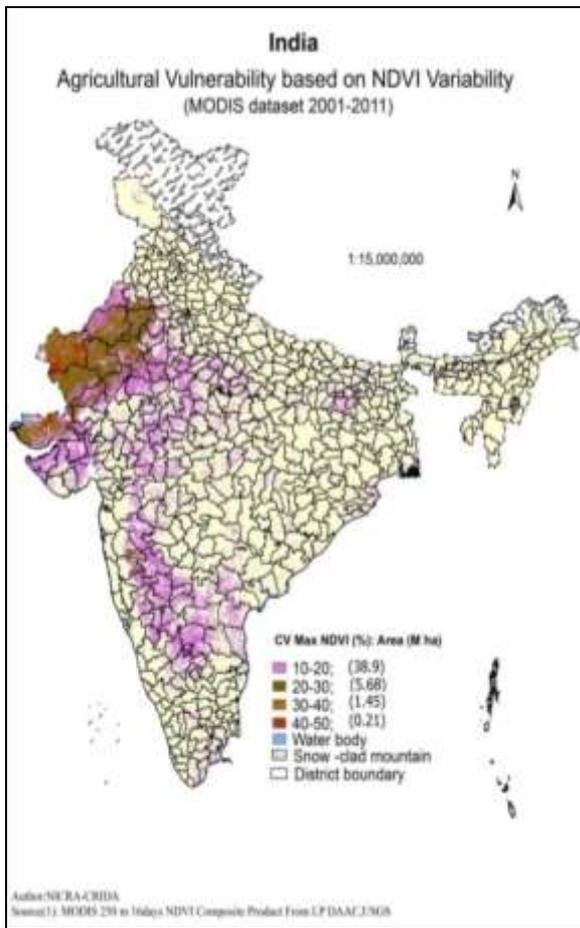


54%

of India faces
HIGH to
EXTREMELY
HIGH water
stress



Impact of Climate Change on Agricultural Vulnerability in India – Assessment through interaction of Bio-physical & Socio-economic factors



Study of 250m MODIS NDVI composite data indicated that over 47 Mha of Net Sown Area in India was vulnerable to Climate Change (*Left*). Assessment of agricultural vulnerability using 8 climatic and socio-economic factors (*Right*). Rainfed districts prioritized for targeting Adaptation & Mitigation measures (*Center*).

OUR WATER SECURITY IS AT STAKE - 1



OUR WATER SECURITY IS AT STAKE - 2



25% of India is turning
into desert.

OUR WATER SECURITY IS AT STAKE - 3



By 2030 we will have
only

50%

of the water we need
for our survival.

River Revitalization: Key Recommendation : **Role for Geomatics Industry**



For every major river, trees must be planted for minimum one kilometer width on either side beyond the river's 25 year flood mark

Why riverside afforestation works

- **River benefits**

- Tree root percolation enhances groundwater aquifers, and river flow
- Trees ensure regular and stable rainfall via evapo-transpiration
- Reduced impact of droughts due to better year round water availability
- Intensity of floods are reduced
- Reduced silting of rivers
- Pollution reduces because tree roots enmeshed with soil act as filters in addition to chemical free agriculture practices

- **Soil and land benefits**

- Reduced soil erosion
- Improved fertility of farmland due to decomposing organic plant material from tree based agriculture and livestock

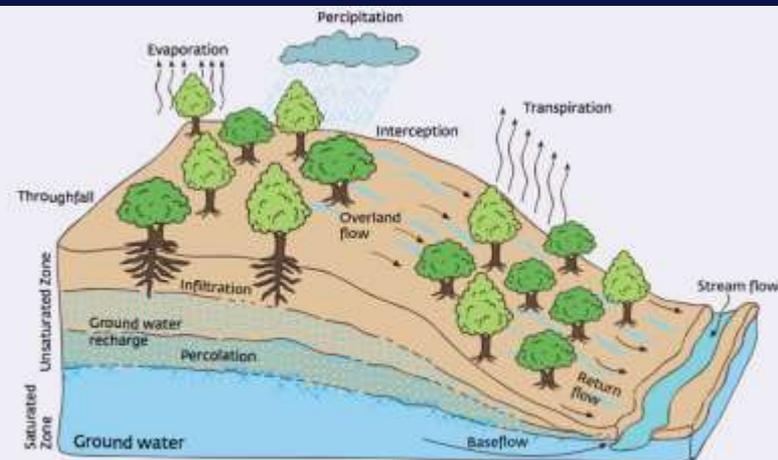
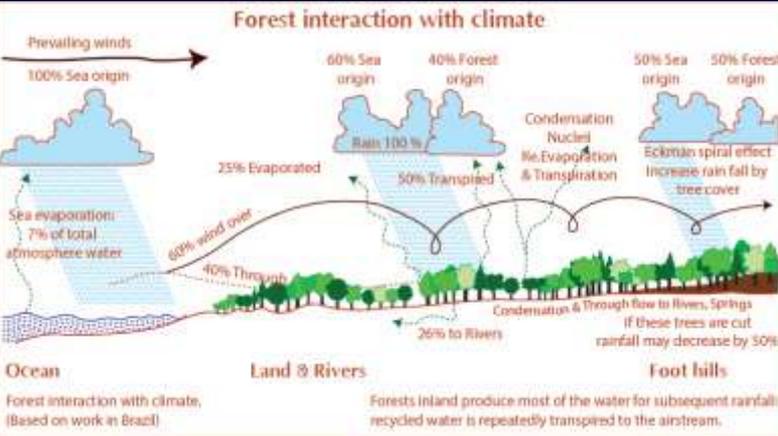


FIGURE 4: PHYSICAL PROCESSES INVOLVED IN RUNOFF AND BASE FLOW

How does this work?



Normalize rainfall

Rainfall is becoming erratic due to climate change. Trees sequester carbon and combat climate change, normalizing rainfall and preventing flood and drought.



Protect the top soil

When it rains, trees reduce the speed of surface water flow, thus protecting the top soil and reducing erosion.



Keep water flowing

Tree roots make the soil porous increasing soil's ability to hold water. This absorbed water is slowly released into the soil, ensuring rivers flow even in the dry season.

River Revitalization

Comprehensive recommendations relating to:

Role for Geomatics

1. Increase water inflow

- Create green cover on either side of the river for a minimum of one km beyond the river's 25 year flood mark

2. Sustainable groundwater and surface water usage to increase base flows to river

- Reduce agricultural water use via micro-irrigation and tree based agriculture

3. Ensuring pollution free water flow

- Tackle urban sewage, agricultural chemical run-offs, and industrial effluents

RIVERSIDE POLICY – 1

PLANT NATIVE TREES ON GOVERNMENT/FOREST LAND: ROLE FOR GEOMATICS



1. Endemic forests that are economically valued

2. Foster community participation and cooperation:

- Community resource management for forest-dwelling communities (Forest Rights Act)
- Ecological sustainable harvesting of forest produce
- Prior buy-back arrangements with trade and industry

RIVERSIDE POLICY – 2

Shift to Organic Tree-based agriculture on private farmer land: **Role for Geomatics**



- 1. Shift to micro-irrigation and agri-horti-forestry model**
- 2. Ideally shift to 'community' led approaches**

**Private
riverside land:**

**Shift to an
agri-horti-forestry
model of
sustainable
agriculture:**

**Opportunities for
Geomatics**

- **A generic multi tier agri-horti-forestry model:**
 - Multiple fruit species ensuring polyculture
 - Multi-purpose trees on east-west border
 - Mulch, herbal trees on north-south border
 - Native livestock to secure soil fertility
 - Fodder crops on boundaries
- **Generic model to be customized for each state and its agro-climatic condition**
- **State experience on the ground:**
 - Maharashtra: Successfully done in various areas
 - AP Govt has announced plans to shift 50% of farmland to horticulture crops

**Private
riverside land:**

**Shift to micro-
irrigation:**

**Opportunities
for Geomatics
Industry**

- **Water use efficiency:**
 - Drip irrigation : 90%
 - Sprinkler: 60%
 - Flood irrigation : 40%

 - Huge potential impact when we consider that 85% of available fresh water is used for agriculture
- Improved yield : 20-40%
- **Reduced ground water consumption**
 - Reduced need for additional borewell capital costs, and the resultant bank loans

**Private
riverside land:**

**Ideally shift to
'community'
micro-
irrigation:**

**Opportunities
for Geomatics**

- **Eliminate farmer's capital investment risk**
 - Corporate sector involvement in providing infrastructural assets
 - Micro-irrigation pilots already in place in Maharashtra, Andhra, Gujarat, Karnataka
- **Develop the enabling policy framework**
 - Ensure protection of farmers' land right, and also safeguard corporate investments
- **Frees up two-thirds of farmer's time**
 - Use that to create allied livelihood to stabilize and diversify agricultural income
 - Skill augmentation and involvement in village/cottage industries, and micro enterprises

Private land:

Policies needed to facilitate farmers' to shift to tree-based agriculture – 1

Opportunities for Geomatics

- 1. Provide livelihood support in the initial gestation years**
 - Compensation for loss of income
 - View this as an investment in securing the farmers' future
 - This investment would be hugely beneficial to the rural economy – and has an attractive internal rate of return
 - **Given on a per tree survival basis**
 - Maharashtra case study exists
- 2. Create farmer-producer organizations**
 - To aggregate produce, secure best prices
 - **Facilitate collective investment and interventions in supply of inputs, micro-irrigation, quality control, grading, storage, cold-chain and transportation**
 - Reap advantages of economies of scale, without farmers losing control over their produce and land

Policies needed to facilitate farmers' to shift to tree-based agriculture – 2:

Role for Geomatics

3. Guarantee offtake by private sector and government

- **Private infrastructure to be setup eg. cold storage, value-added processing units and allied industries**
- **Industry to invest upfront – therefore facilitate infrastructure setup through soft loans etc. eg. via NABARD**
- Get people to eat more fruit as a health initiative
- Bring fruits into midday meals, anganwadis as a children's health initiative
- Better price realization for farmers by streamlining and strengthening existing trading channels

4. Need a minimum support price (MSP)

- Similar to the existing MSP regime
- This plan envisages to actively create and strengthen consumer demand and the required forward linkages, so that in the end the MSP serves the purpose of being a floor price.

Three-fold national benefits: *Scope for Geomatics Industry participation*

Benefits across river stretch of 40,000 sq.km

- **Environmental benefits**

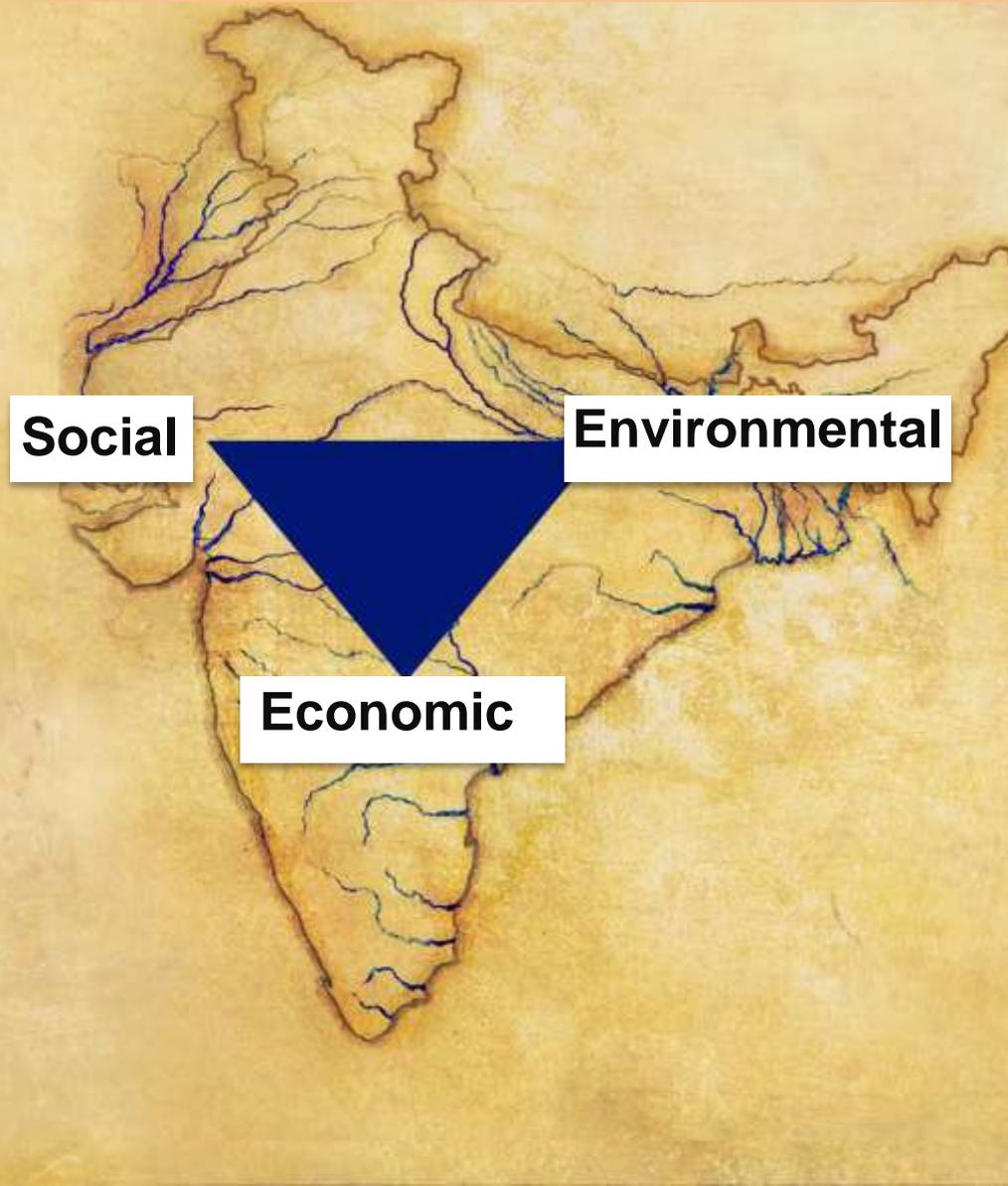
- Enhanced water availability
- CO₂ reduction:
14 million tons pa -
0.6% of national target
- Green cover:
0.4 million hectares -
1.3% of national aspiration

- **Social benefits**

- Farmer income increases manifold
- Directly benefits 2.6 lakh farmers
- Healthy lifestyle change with enhanced fruit consumption

- **Economic benefits**

- Boosts rural economy by up to 0.1% of GDP
- Sustainable agriculture





Phase 3A:

Facilitate required government policy changes:

Now in progress

Role for Geomatics Industry

- **Supported by 18 state governments**
- **Six MOUs have been signed between states and Isha Foundation:**

Maharashtra, Karnataka, Punjab, Gujarat, Chattisgarh, Assam

- **Prime Minister notifies expert group comprising six govt secretaries commended by the CEO, NITI Aayog to finalize way forward**

Creating a peoples' movement

Role of State Government – 1

: Opportunities for Geomatics Industry

- Firm up plan to shift from water intensive crops to organic tree based agriculture on private riverside land for a minimum one km beyond the 25 year flood mark
 - Recommend a 10000 hectare sized pilot
 - On success : scale-up to all the rivers in the state
 - Enable single window for farmer: Convergence of all schemes at the front end
- Firm up strategy for state-wide afforestation of riverside government and forest land for a minimum one km beyond the 25 year flood mark

Role of State Govt – 2

Converge/ establish enabling policies :

Role for Geomatics Industry

1. Livelihood support based on tree survival during gestation period
2. Facilitate set up of Farmer producer organizations
3. Facilitate Private sector infrastructure setup and buy back tie-ups
4. Bring in fruit consumption in mid-day meals, and in aanganwadis as a childrens' health initiative
5. Establish minimum support price for tree-based produce
6. Enable crop and livestock insurance
7. Facilitate nursery infrastructure
8. Facilitate organic certification
9. Facilitate community forest resource management rights under FRA and sustainable harvesting of forest produce by communities
10. Framework for community micro-irrigation
11. Industrial effluent treatment framework via private industry
12. Framework for urban sewage collection and treatment via private industry, and for channelizing the treated water to industries

Creating a peoples' movement:

Role of Isha Foundation

1. Aggregate and channelize energies of volunteers and local NGOs to ensure effective on-ground implementation
2. Facilitate convergence at panchayat level
3. FPO management, technical expertise
4. Facilitate industry investment and tie-ups
5. Create and manage nurseries promoting allied livelihood for women
6. Promote fruit consumption in the general population as a health initiative
7. Drive behavior change for all stakeholders
8. Provide technical support
9. Facilitate corporate CSR funding
10. Create detailed project report (DPR)



Phase 3B:

Shape and execute on-ground programs in partnership with government and private sector

Now in progress

- MOUs signed with six states
- Detailed project planning commencing

A pair of weathered, brown hands is shown from a top-down perspective, gently cupping a small, vibrant green seedling with four leaves. The seedling is positioned in the center, growing out of a crack in the parched, yellowish-brown soil. The background is a network of deep, dark cracks in the earth, symbolizing drought and environmental crisis. The lighting is natural, highlighting the textures of the skin and the soil.

**RALLY FOR
RIVERS**
INDIA'S LIFELINES

HOW YOU CAN SUPPORT PHASE 3B

Tackling pollution :

Role for Geomatics Industry in mapping, project implementation & monitoring

1. Agricultural chemical runoffs estimation

- Beneficial impact of organic riverside trees, and their natural filtering effect

2. Tackling urban sewage pollution through monitoring

- Facilitate establishment of private sector sewage collection and treatment industry
- 62,000 MLD of sewage of which 62% is untreated
- Build capability to use treated sewage water for industries

3. Industrial effluents monitoring

- Water treatment should be done by a specialist treatment industry and not by the polluting industry
- Bring in online sensor based monitoring, and impose on-the-spot fines for violations

Maintaining environmental flows in rivers :

Role for Geomatics Industry

- **Environmental flows monitoring**
 - Quality, quantity and timing of water flows
 - Required to maintain components, functions, processes, and resilience of aquatic ecosystems
 - A central element in water resources planning & management for sustainable development
- **Environmental flows to be maintained for every river till the coast - monitoring**
 - Enough flow to sustain flora & fauna in ecologically sensitive zone along river
 - Necessary to revitalize rivers
 - Mandate under Environment Protection Act, 1986
- **Urgent research focus needed on assessing environmental flows – support research**
 - To recognise physical limit beyond which water resource suffers irreversible damage to ecosystem functions
 - To systematically balance multiple water needs of society in a transparent & informed manner

Demarcating Eco-Sensitive Zone along rivers :

Role for Geomatics Industry

- Policy required to protect rivers from further damage
 - While supporting agricultural & forest-based livelihoods
- Provision of declaring Eco-Sensitive Zones under Environment Protection Act, 1986 can be used
 - Currently used in buffer areas of Protected Areas
- Empowers Government to restrict areas in which:
 - Certain industries, operations & processes cannot be carried out
 - Or can be carried out only with adequate safeguards
 - Areas selected according to defined criteria
- Area up to 25-year flood mark to be demarcated and declared as ESZ under Environment Protection Act, 1986

Over-arching strategy for two kinds of riverside land:

1. Private farm land

2. Govt, Forest land

Role for Geomatics Industry

1. For Private lands

- Move from water intensive ploughed crops to organic tree based agriculture
 - Implement across 40,000 sq km along riverside ie. on 0.03% of net sown area
- Move from flood irrigation to micro-irrigation
- Encourage farmers to shift via a peoples' movement
 - With an underlying economic model that more than doubles farmers' incomes
 - Could do so in phases for a given farmer eg. 40% of landholding initially

2. For Government land, forests, village commons

- Plant native forests

The Outcome



Help Keep Rivers Flowing

Improve Ecological Diversity

Normalize Rainfall

Improve Water Quality

Prevent soil erosion

Lessen impact of floods and drought

- ▶ This solution ensures that river flow is perennial while also **enhancing farmers' livelihood** by doubling their income
- ▶ This simple yet highly effective solution are **supported by many scientific studies**

Phase 1:

**Create detailed
technical
recommendation
and submit to
government**

Task completed





Phase 2:

Build public momentum and awareness for change

Task completed

- **Supported by 160 million people in India and around the world**

Phase 3: Pilot Study : Economics for Private Farmland in India

- Of the total land along the riverside it is expected that:
 - 75% is privately owned farmlands
 - 25% is owned by the government
- Isha Foundation proposes to start a pilot where 50km of private farm land is shifted to tree-based agriculture
- It may be that some farmers convert only a 1/3 of their land in the first phase. If that happens at large-scale, then to get 50km of tree-based agriculture we may have to initially cover 150km of private farm land.



Budget estimate for 50 kms of riverside land converted to tree based agriculture

Sl.No	Area of expenditure	Cost (In crores)	Supported by
1	Proposal Development Cost	1.15	CSR
2	Crop Establishment & Maintenance for 3 years	444	Govt
3	Awareness Generation activities (1 st two years)	4	CSR
4	Livelihood subsidy (Based on survival of trees)	250	CSR/Govt
5	Benchmark Setting, Monitoring & Evaluation and Impact measurement (GIS based)	1.5	CSR
	Total (Phase 1 – spanning 5 years)	701	

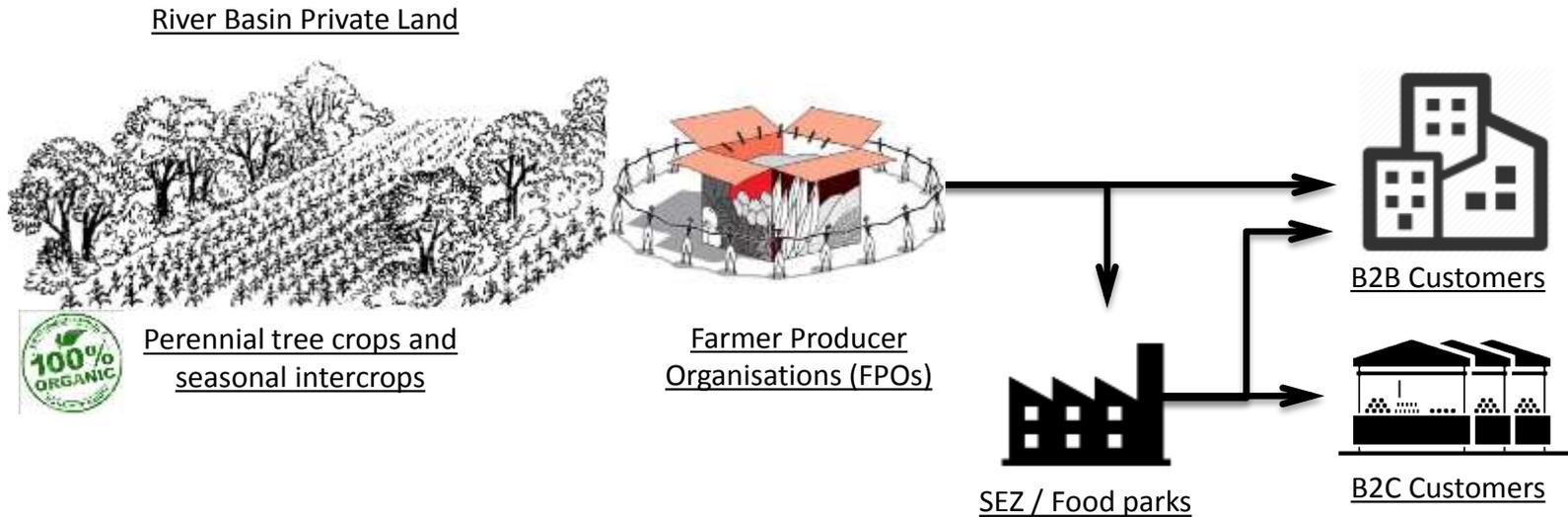
- + Corporate partnerships to guarantee offtake of farm produce
- + Establish mechanism for minimum support price of above
- + Establish private partnership for community based irrigation

Possible direct impact of a sample 50 km stretch program

Sl.No	Area of Impact	Qty	Units
1	No of direct beneficiaries	100,000	Farmer families; 25000 farmers
2	No of Indirect beneficiaries	16,00,000	Riverine population
3	Green cover Increase (permanent) and Area of soil protected from erosion & Chemical leaching	100	Sq Kms
4	No of trees grown	8.75 Million	Trees
4	Fruits produced	1,20,000	Tons
5	Carbon Sequestration	1,90,000	Tons of Co2
6	Oxygen Generated	5,00,000	Tons of O2

United States Department of Agriculture's Forest Service estimates that over a 50-year span, a tree generates \$ 162,000 in benefits : \$31,250 worth of oxygen, \$62,000 worth of air pollution control, recycles \$37,500 worth of water, and controls \$31,250 worth of soil erosion. Tree roots remove nutrients harmful to water ecology and quality - *American Forests, "How Trees Fight Climate Change", 1999.*

Envisaged Operating Model : Role for Geomatics Industry



Farmers in river basin to grow perennial tree crops and seasonal intercrops to sell in companies (B2B) as well as consumers (B2C) through FPO.

Four RFR Milestones : Role for Geomatics Industry

1. Do a initial feasibility study that forms the basis for the detailed project report (DPR)

- Identify stakeholders for the DPR, Identify the target tributary, identify local NGO partners; ascertain local volunteer capability; finalise milestones; finalise budget for the DPR

2. Do the DPR

- Shape the overall plan of implementation detailing the methodology, strategy; implementation timeline; resources requires (software and hardware); budgets; mapping of government schemes and programs that will be leveraged for project execution; monitoring, evaluation & impact assessment plan

3. Execute on-ground

4. Sustain the program for India



Thank You

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www.ishafoundation.org

www.crida.in

www.icar.gov.in