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REGENERATIVE FARMING

INSIDE

NATURE BASED SOLUTIONS AND NATURAL FARMING

All humans have the fundamental right to food. The capacity to support life has, however, been diminished by the current system. Food is a sensory experience for the wealthy and it gives the destitute a way to survive. Good food that provides immunity and nutrition without harming the environment is expensive and hard to come by.

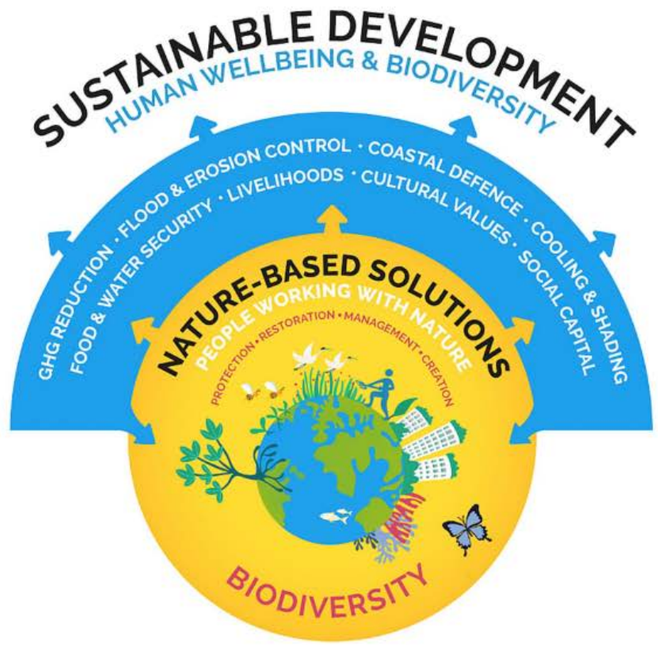
As food is a fundamental right, the food system must ensure that this right is respected. Every aspect of today's food system is impacted by unequal transactions, which lead to disparate outcomes ranging from a lack of affordable and accessible nutritious food to an abundance of food with poor nutritional value.

The environment, including the soil, water, and air, is drained and polluted. Deserts and wastelands are replacing fertile lands and ecologically diverse regions. The system appears to be terminal, not regenerative and its most profound symptom is poverty.

The Meaning of Nature-Based Solutions (NbS)

An integrated strategy that can address climate change and biodiversity loss, while promoting sustainable development, is known as "Nature-based Solutions", which are solutions to societal problems that entail working with nature. Despite the fact that planting trees for carbon sequestration has received much of the recent attention, there are grave concerns that this is detracting from the necessity to safeguard already intact ecosystems and quickly phase out of the usage of fossil fuels.

Several major global synthesis research papers that collectively present a dire assessment of the current state of the climate and biosphere have been published over the past two years. Not only are we failing in our attempts to restore equilibrium to the climate (IPCC, 2014, 2018) and curb the loss of biodiversity on land (IPBES, 2019; NYDF Assessment Partners, 2019; WWF, 2020a) and sea (IPCC, 2019a), but these failures are also escalating global poverty and inequality, while seriously weakening the development accomplishments made during the 20th century (IPBES, 2019; WEF, 2020a, 2020b). There is an increasing recognition that these problems are connected and cannot be addressed individually. (IPCC, 2019b; Turney et al., 2020). There are increasing empirical evidences pointing towards the fact that the natural systems on which we depend are deteriorating past a point of no return (IPCC, 2018; Rockström et al., 2009; Steffen et al., 2015). In this context, Nature-based Solutions (NbS) have recently gathered due attention as a holistic approach to combat the dual threat of climate change and biodiversity loss (Seddon, Chausson, et al., 2020), while supporting the Sustainable Development Goals (Gómez Martín et al., 2020; Maes et al., 2019). NbS are actions that are broadly categorized as the protection, restoration or management of natural and semi-natural ecosystems, sustainable management of working lands and aquatic systems.



Natural Farming as a Nature Based Solution

Natural Farming, is a NbS, that refer to a chemical-free traditional farming method. It is regarded as agroecology based diversified farming method that incorporates plants, animals and trees with a functional biodiversity. Natural Farming, is also considered a way of life, beyond a technique of farming land, referred to as "the Fukuoka Method"- the natural way of farming or "do-nothing farming". Fukuoka, a Japanese scientist who disapproved of both contemporary agribusiness and centuries-old agricultural folklores, invented the "do-nothing" method. He encouraged individuals to stop using manufactured equipment and inputs, including pesticides, fertilizer, tillage, and—perhaps most importantly—wasted effort.

Natural farming is related to fertility farming, organic farming, sustainable agriculture, agroecology, agroforestry, ecoagriculture and permaculture. It seeks to maximize production variables (labor, soil, equipment) while minimizing the use of artificial inputs (fertilizer, herbicides, and pesticides) so as to boost production potential and offer an abundant supply of food that is of the highest possible quality at the most competitive price. The key is to increase the amount of organic matter in the soil since this promotes microbial activity, which enhances soil fertility. Contrarily, conventional farming does not seek to maximize yields by using inputs, necessitating prolonged cultivation over bigger areas in order to generate the required quantities.

3 Key Contributions of Natural Farming

Pioneers of Natural Farming in India

When discussing Natural Farming in India, mention must be made of the two pioneers who brought it due attention:

1. Shri Subhash Palekar

Padma Shri–awardee Subhash Palekar is popularly known as 'Krishika Rishi' by many farming communities in India. He is an agricultural scientist who developed Natural Farming as a concept in the country. Using cow dung and cow urine as the foundation of his farming methods, Palekar was inspired by traditional Indian farming methods. He refers to his method of farming as spiritual farming and credits the Vedas, Upanishads, and other ancient texts for much of his inspiration. He also asserts that Natural Farming is environmentally beneficial and capable of self-regeneration.

In 1972, Palekar graduated with a degree in agriculture before returning to his village in Maharashtra. After spending a decade working on his father's farm, he finally recognized how the Green Revolution's hazardous chemicals were slowly killing the soil and lowering farm output. In pursuit of a better solution, he looked to nature and discovered that the forest's natural mechanism allowed vegetation to grow while protecting the ecosystems. Large trees grew organically without any chemical assistance and established that plants too can flourish without the usage of chemicals. This is because the microorganisms on a farm that transform raw nutrients into easily digestible forms are harmed by pesticides and chemical fertilizers.

He since learned, via years of trial and error, that only locally available soil, cow breeds, and seeds can be used to develop this culture, making it a self-sustaining, free, and homegrown technique. He invented his own method of "Natural Farming" after doing in-depth research and raising plants himself. Palekar later presented his findings to farmers all around the nation and has been voluntarily educating farmers about his method all around the nation.

N. Chandrababu Naidu, former Chief Minister of Andhra Pradesh, selected Palekar as his advisor for the agricultural sector in 2007 and allotted Rs 100 crore to advance the system in the state.

2. Shri Acharya Devvrat

The credit of Shaping 'natural farming' movement in Himachal Pradesh goes to former Governor of Himachal Shri Acharya Devvrat, who is presently the Governor of Gujarat. In just three and a half years, natural farming has spread to every Panchayat and hamlet in the state due to his tireless efforts. As soon as he took office as governor of Himachal Pradesh, he began working with social organizations to educate farmers in the state about natural agricultural practices and encourage them to embrace them. To educate faculty and students at the state's agriculture, horticulture, and forestry universities, national seminars were organized. He created an environment in Himachal Pradesh that was favorable to natural farming, and as a result, the state's government established a "Task Force" for natural farming in January 2018. The State Government announced the "Prakritik Kheti Khushhal Kisan Yojana" on March 9th, 2018, and resolved to put the Subhash Palekar Natural Farming Technique into practice with a budget provision of Rs 25 crore. Soon after, the state government established a State Project Implementing Unit (SPIU) under the direction of Acharya Devvrat and created a roadmap for promoting natural farming in the state that included camps led by Shri Subhash Palekar.

He left Himachal Pradesh on July 21, 2019, to take up his position as governor of Gujarat, but more than 7000 farmers in the state had already switched to natural farming on more than 700 hectares of land by that point. He continues to provide support and direction to the Himachal Pradesh State Project Implementing Unit of the Prakritik Kheti Khushal Kisan Yojana. In Himachal Pradesh, some 2 lakh farmers have already switched to natural agricultural methods, and thousands more are prepared to do the same.

~ Chaynika Pasari, APPL Foundation

REGENERATIVE FARMING: HEALING OUR EARTH ONE HARVEST AT A TIME

Why we need Regenerative Farming for our Planet.

With an ever-growing global population and increasing concerns about the depletion of natural resources, solving the challenge of sustainable agriculture has become more important than ever. Conventional farming practices, with their heavy reliance on synthetic fertilizers and pesticides, have proven to be detrimental to the environment, leading to soil erosion, depletion of nutrients, and loss of biodiversity. As a response to these issues, regenerative farming has emerged as a promising solution. I will explore the concept of regenerative farming, its principles, benefits, and challenges, and why it holds the potential to revolutionize the way we grow our food.

In simple bullet points, I will try to explain the importance of Regenerative Farming (RF) so that it can be understood by some readers who might not be connected with agriculture.

Regenerative Farming: A Simple Overview

Regenerative farming can be seen as a holistic approach to agriculture that aims to restore and enhance the health of the soil, increase biodiversity, improve water quality, and sequester carbon in order to create a sustainable and resilient farming system. Unlike traditional farming practices that focus on maximizing short-term production, regenerative farming considers the long-term health and viability of the land.

Key Principles of Regenerative Farming

Soil Health: Regenerative farmers understand the importance of healthy soil as the foundation for productive and resilient farms. They prioritize practices such as minimal tillage, cover cropping, and crop rotation to build organic matter, improve soil structure, and increase water-holding capacity.

Biodiversity: By cultivating a diverse range of crops, regenerative farmers create habitats for beneficial insects, birds, and soil microorganisms. This helps to control pests and diseases naturally, reducing the need for synthetic pesticides.

Crop Rotation: Regularly rotating crops not only breaks pest and disease cycles but also improves nutrient availability and reduces the need for fertilizers. By varying crops from season to season, nutrient imbalances are minimized, resulting in healthier plants and more productive agricultural ecosystems.

Water Management: Regenerative farmers use agroforestry and contour plowing to reduce water runoff and soil erosion. They also utilize irrigation systems that efficiently use water by minimizing evaporation and promoting water infiltration.

Benefits of Regenerative Farming

Soil Regeneration: Regenerative practices help to rebuild soil organic matter, improving soil fertility and structure. This leads to increased water retention, reduced erosion, and enhanced nutrient availability, ultimately resulting in healthier and more productive soils.

Carbon Sequestration: Regenerative farming plays a crucial role in mitigating climate change by sequestering carbon in the soil. By adopting practices that increase organic matter content, such as cover cropping and composting, farmers can actively remove carbon dioxide from the atmosphere and store it in the ground.

Enhanced Biodiversity: Regenerative farming promotes the conservation of native plants, insects, and animals, creating a more diverse and resilient ecosystem. This leads to improved pollination, natural pest control, and increased overall farm productivity.

Economic Viability: Contrary to some beliefs, regenerative farming can be economically viable. By reducing the reliance on expensive external inputs like synthetic fertilizers and pesticides, regenerative farmers can decrease production costs. Moreover, practices like crop rotation and cover cropping can help increase yields and reduce the risk of crop failure. It will not happen unless we succeed in making it commercially attractive for the farmers.

Main Challenges in Adopting Regenerative Farming

While regenerative farming holds significant promise, there are several challenges in widespread adoption:

Transition Period: Shifting from conventional to regenerative farming practices requires a transition period that may involve a decline in short-term productivity. This can be financially challenging for farmers who rely on consistent yields to meet their operational expenses.

Knowledge and Technical Support: Many farmers lack access to the necessary knowledge, training, and technical support needed to implement regenerative practices effectively. Governments, agricultural organizations, and research institutions must invest in education and extension programs to empower farmers and facilitate the transition.

Market Demand: Regenerative farming often results in higher-quality products, but the market demand for such products needs to be strong enough to encourage farmers to invest in these practices. Educating consumers about the benefits of regenerative farming and supporting local and regional markets can help create a demand for sustainable produce as Regenerative farming products are costly.

In Conclusion

Regenerative farming offers a transformative approach to agriculture that prioritizes ecological health, soil regeneration, and climate mitigation. By adopting practices that enhance soil health, increase biodiversity, and promote sustainable water management, regenerative farmers can create resilient and productive farming systems. However, addressing the challenges of transition, knowledge dissemination, and market demand will be essential to realizing the full potential of regenerative farming. With concerted efforts from farmers, policymakers, consumers, and other stakeholders, regenerative farming can pave the way for a sustainable and secure food future for our planet Earth and its residents.

Though there are many critics who feel that we cannot feed the world with Regenerative Farming , I feel Embracing this approach can help us to heal the Earth one harvest at a time and secure a better future for the generations to come.

~ Arvind Awasthi

SCOPE OF REGENERATIVE FARMING IN INDIA AND THE CHALLENGES

Regenerative farming holds immense promise for the future of Indian agriculture, offering a holistic and sustainable approach to cultivation. The scope of regenerative farming in India is broad, encompassing various aspects that can transform the agricultural landscape for the better.

The key aspects of regenerative farming are:

1. **Soil Health and Fertility:**
   Regenerative farming emphasizes practices such as cover cropping, minimal tillage, and organic matter incorporation. These techniques enhance soil structure, foster microbial diversity, and improve nutrient cycling, ultimately leading to healthier and more fertile soils. In a country where soil degradation is a significant concern, regenerative agriculture provides a pathway to rejuvenate and sustain the land.

2. **Water Conservation:**
   Water scarcity is a pressing issue in many regions of India. Regenerative farming practices, including agroforestry and rainwater harvesting, can contribute to water conservation. By optimizing water use efficiency and reducing runoff, regenerative agriculture helps farmers adapt to changing climate conditions and ensure a more sustainable water supply for agriculture.

3. **Biodiversity Enhancement:**
   Traditional agricultural practices often contribute to biodiversity loss. Regenerative farming promotes biodiversity through the integration of diverse crops, cover crops, and agroforestry. This not only supports a healthier ecosystem but also provides habitat for beneficial insects and wildlife. The resulting balance contributes to natural pest control and pollination, reducing the need for external inputs.

4. **Carbon Sequestration and Climate Resilience:**
   India, like many other countries, faces the challenges of climate change. Regenerative farming practices play a crucial role in carbon sequestration, capturing atmospheric carbon and storing it in the soil. This not only mitigates the impacts of climate change but also enhances the resilience of farms to extreme weather events and shifts in climate patterns.

5. **Economic Benefits for Farmers:**
   Regenerative farming can offer economic advantages to farmers. While there may be initial transition costs, the reduction in dependency on expensive inputs like synthetic fertilizers and pesticides can lead to long-term cost savings. Additionally, the emphasis on soil health often results in increased yields and improved crop quality, contributing to enhanced economic sustainability for farmers.

6. **Adaptability to Various Scales:**
   One of the notable features of regenerative farming is its adaptability to different scales of agriculture. Whether practiced on large commercial farms or by smallholder farmers, regenerative techniques can be tailored to suit the specific needs and resources of diverse agricultural operations, promoting inclusivity.

7. **Consumer Demand for Sustainable Products:**
   With a growing global and domestic awareness of environmental issues, there is an increasing demand for sustainably produced food. Regenerative farming aligns with these consumer preferences, providing farmers with opportunities to access markets that value environmentally conscious and ethically produced agricultural products.

In conclusion, regenerative farming in India has the potential to revolutionize the agricultural sector by addressing critical challenges such as soil degradation, water scarcity, and climate change. As farmers increasingly recognize the long-term benefits of regenerative practices, and as supportive policies and awareness campaigns gain traction, the scope for regenerative farming to become a mainstream approach in Indian agriculture continues to expand. The journey towards regenerative agriculture in India signifies not just a shift in practices but a transformative evolution towards a more sustainable and resilient farming future.

The Challenges:

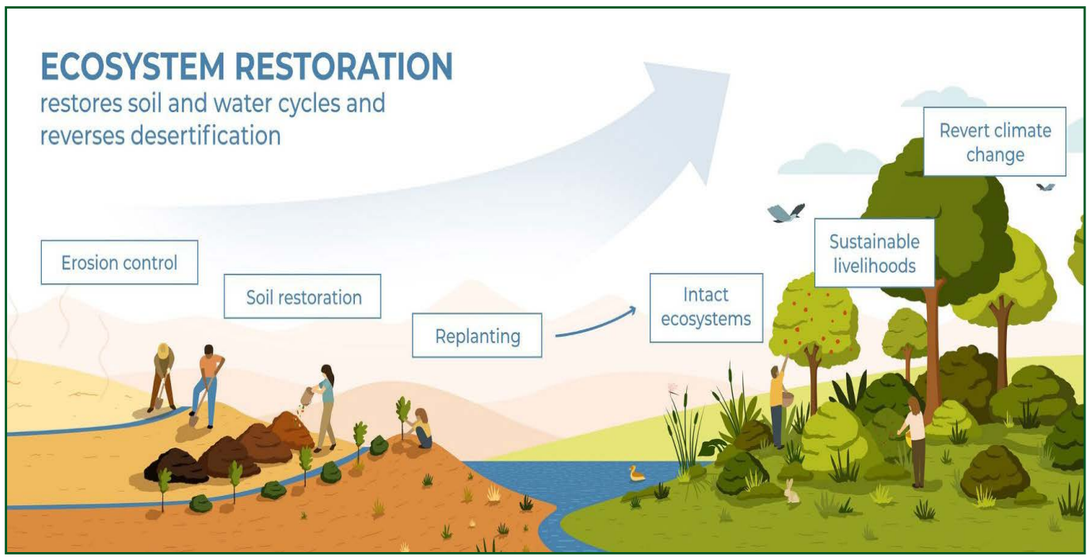
While regenerative farming holds significant promise for sustainable agriculture, its adoption comes with several challenges. Overcoming these challenges is crucial for the widespread implementation of regenerative practices.

Some of the key challenges in regenerative farming are:

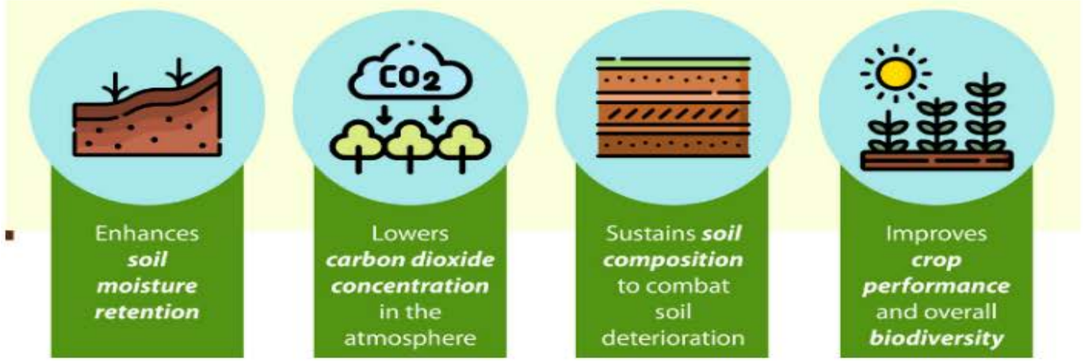
1. Lack of awareness and education, which needs extensive awareness and education programs to disseminate information and build understanding among farmers.
2. Initial transition costs while shifting from conventional farming practices to regenerative methods that may involve initial investments in training, equipment, and changes to infrastructure. Small and resource-limited farmers may find these costs prohibitive.
3. Market access and certification that supports regenerative products can be challenging. Additionally, certification processes are essential to assure consumers of the sustainability and quality of regenerative products, but setting up such systems can be complex.
4. Policy support is the key to adoption of regenerative practices. Policymakers need to create an enabling environment that encourages farmers to transition to regenerative methods.
5. Resistance to change is quite likely. Farmers accustomed to traditional farming practices may resist adopting regenerative methods. Overcoming this resistance requires targeted education, extension services, and demonstration of the benefits through pilot projects.
6. Limited access to resources such as technology, finance, and training can impede the widespread adoption of regenerative practices, especially among smallholder farmers.
7. More research is needed to adapt regenerative practices to diverse agro-climatic conditions in different regions of the world, including India. Developing region-specific solutions for pests, diseases, and crop varieties is essential.
8. The long-term impact and success of regenerative practices need to be continually monitored and evaluated. This requires investment in research and data collection to assess the effectiveness and sustainability of regenerative agriculture over time.
9. While regenerative practices have shown success on smaller scales, scaling up these methods to larger commercial farms may have its own challenges. Integrating regenerative principles into large-scale agriculture requires careful planning and adaptation.
10. Socio-cultural factors may influence the acceptance and adoption of regenerative farming practices. Understanding and addressing these factors are essential for successful implementation.

Addressing such challenges requires a multi-stakeholder approach involving farmers, government agencies, non-profit organizations, research institutions, and the private sector. Collaborative efforts are necessary to provide the necessary education, support, and resources to enable a smooth transition to regenerative farming practices, ensuring long-term sustainability and resilience in agriculture.

~ Dr. M S Basu



REGENERATIVE AGRICULTURE APPROACH



WHY DO WE NEED REGENERATIVE APPROACHES IN FARMING AND AGRICULTURE?

'Agriculture is an ecological act'.

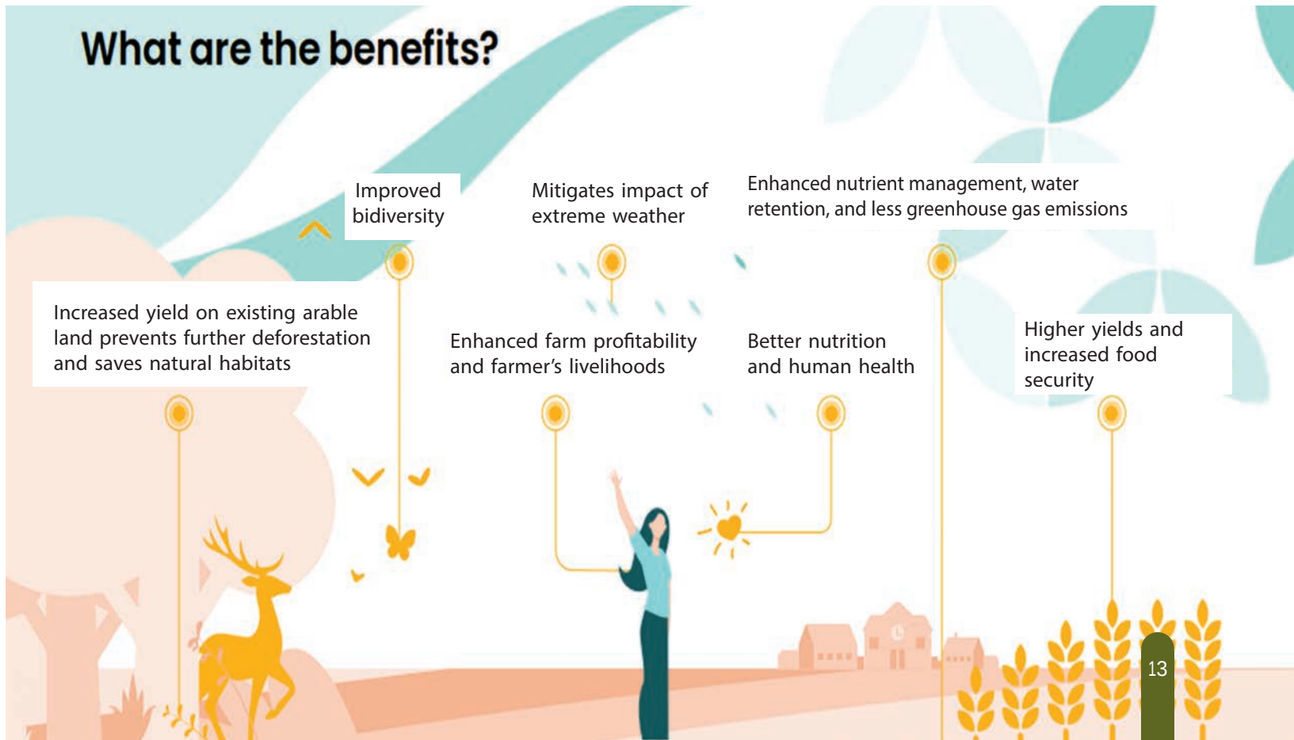
This expression captures and indicates the expansive nature of regenerative agriculture's revolutionary potential as well as the food system that should be universally envisioned.

Agriculture that is sustainable is concerned with long-term, endured enrichment of the soil, seeds, microbes, plants, water table, and environment; it is the antithesis of the scarcity and inequality that the current conventional methods of agriculture are characterised by. No element of the existing system can be considered as sustainable – seeds must be purchased, and soil must be prepared from the ground up for each season. In addition, excessive use of ex-situ chemicals stresses plants and suppresses the natural microbial activity of the soil. Being forced to buy larger quantities of inputs at ever-rising prices, the farmer is thus, disempowered. Few mighty sectors dominate everything and control most profits.

Alternatively, Regenerative Farming encourages biological investments in the soil to make it dynamically fertile and nutrient-rich so that the annual need for outside input keeps reducing. It supports the environment's natural resources and water retention. The soil and biosphere's 'goodness' builds up over time, becoming a reliable foundation for the farming family to rely on. Farmer households can generate earnings without negatively affecting the environment. Being fair and life-giving in its nature, Regenerative Farming ensures that there will be plenty of food and nourishment for both people and the planet.

Impact on Human Health and Wellbeing:

Good food production depends on healthy soil. A healthy soil is home to a wide variety of microorganisms, including bacteria, fungus, actinomycetes, and others. Human health benefits greatly from the interactions between soil, plants, and microbes. These interactions occur between healthy soils and plants, which result in the synthesis



of health-promoting compounds, such as antioxidants, anti-cancer compounds, vitamins, and minerals. Once these interactions have been disrupted, the soil begins to die. A dying soil is unable to provide the plant with the best nourishment, and the plant, in turn, is unable to nourish the human body that consumes it. This is the cycle that has been continuing for decades. Despite being a biologically essential component of the ecological cycle, soil has traditionally been viewed as a mere base to grow plants.

By investing in the development of a fresh topsoil layer, Regenerative Agriculture promotes the soil-plant-microbe interaction. In addition to promoting the development of disease-suppressing soils, it produces a restorative soil microbiome and its symbiotic nutrient web, which effectively retains water due to the abundance of soil carbon. According to studies, a balanced soil microbiome is directly related to human immunity.

Impact in relation to Climate Change:

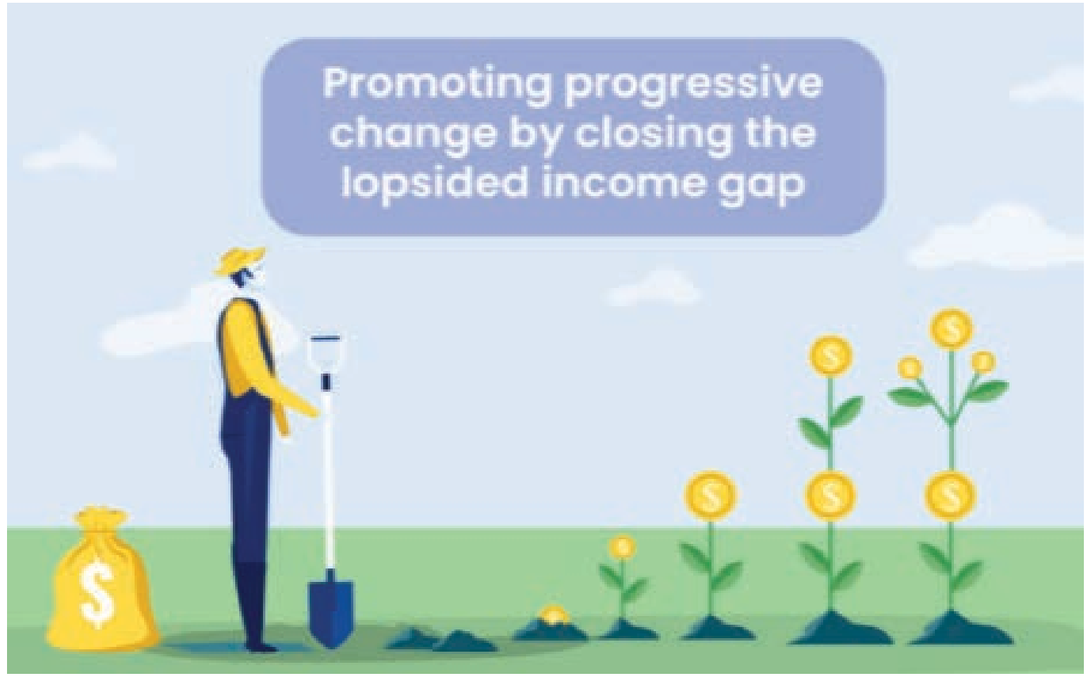
Following the start of the soil transformation, along with specific land management techniques, a constant and ongoing increase in fertility is initiated, regularly reinforced with compost and its essential soil organic carbon (SOC). The porosity of the ground and its capacity for holding water grow as the fertility of the land rises, both from a SOC and soil microbial perspective. Soil and plants become more resistant to weather patterns as a result.

Impact on Farmers:

Small-scale farmers, who are the majority of farmers in India, are the most exploited and disadvantaged part of the food supply system. They are caught in a web of inadequate crop planning, decreased landholdings, rising input costs, lack of market intelligence, and uncertainty over output and prices. A network of intermediaries, including traders, transporters, processors, packagers, and advertisers, benefit off the production and consumption of goods.

Regenerative agriculture helps farmers better withstand market forces and leverage the market for their own gain by increasing the value of their resources and assets, including soil, groundwater, crops, and residue. They will be able to transition away from subsidies and loans, towards entrepreneurship and negotiations on equal terms through the use of this technology and the sharing of market information. The entire chain of food production and supply will be governed by ethical practises.

~ Chaynika Pasari, APPL Foundation



SCALING REGENERATIVE AGRICULTURE TO DRIVE SUSTAINABLE TRANSFORMATION IN FARMING

Agriculture systems have overtime evolved to cater a growing population. The focus has been on high yields and low costs. Resultantly, food production now accounts for a third of global GHG emissions, (70% freshwater use and 90% of land-use change), making them one of the foremost drivers of natural resource degradation.

Agriculture production hence is increasingly contributing to climate change and getting impacted by it at the same time. Farmers, particularly in the global south, are becoming highly vulnerable, with their livelihoods and global ecological security at risk.

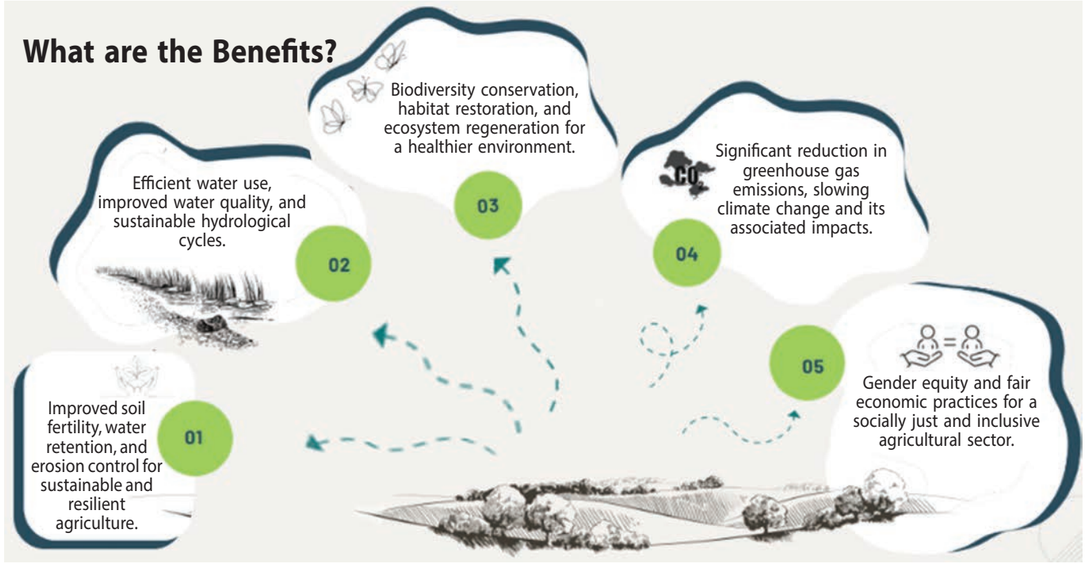
An urgency to repair our agriculture systems is required and regenerative agriculture is emerging as the way forward.

What is Regenerative Agriculture?

Simply put, regenerative agriculture fosters food production in a way that restores and revives the three core natural components – soil, water, and biodiversity, while preserving farmer's livelihood and reducing GHG emissions.

With its benefits, Regenerative Agriculture is being seen as the way forward in transforming our food systems. Food companies are leaning increasingly on Regenerative Agriculture as the most preferred pathway to reduce their impact/footprint and make their supply chains sustainable. The commitments and investments planned towards this, are being seen as a catalyst to scale regenerative agriculture across the globe.

However, scaling regenerative agriculture faces a multitude of challenges. These range from the



very definition of regenerative agriculture, high dependency on data and its integrity, availability of good quality bio-inputs and advisory, among others.

These get further complex when regenerative agriculture is being implemented in smallholder systems like India.

Regenerative Agriculture in India

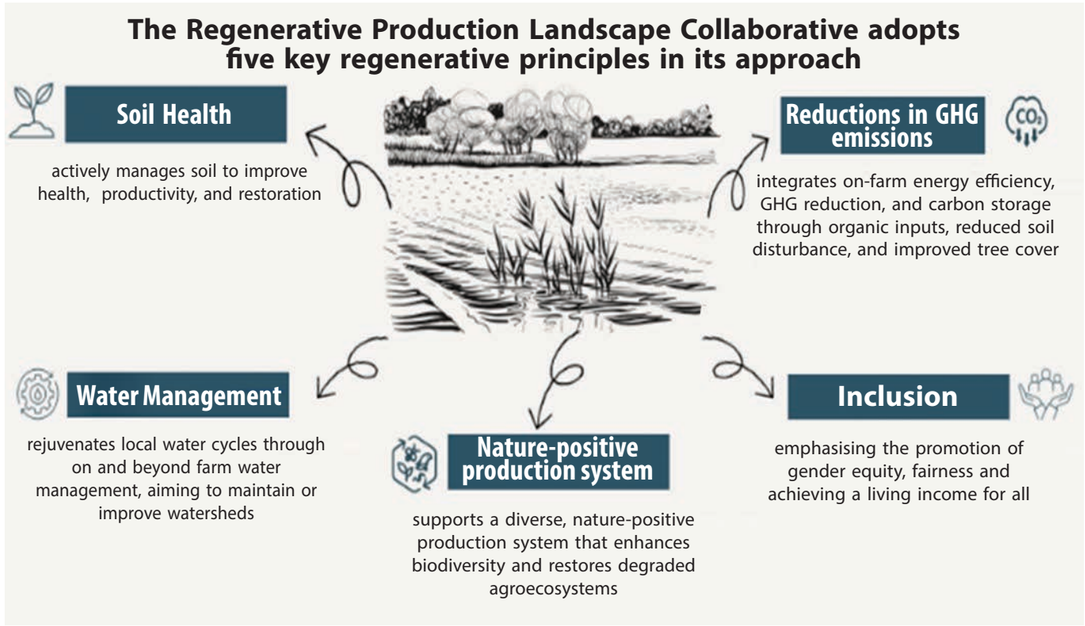
India with just 2.4% of the global landmass and 4% of water reserves, hosts ~18% human population, 8% biodiversity and 20% cattle. It also produces ~10% of the global food and ~25% of its milk.

This juxtaposed with the fact that a third of India's land is degraded, reveals the tipping point its agriculture landscapes currently find themselves in.

Furthermore, India's agriculture is marred with deepening inequity. As of 2015, just 4.4% farmers in India owned 30% of the country's operational farmland. On the other hand, 86% farmers owned just 47%.

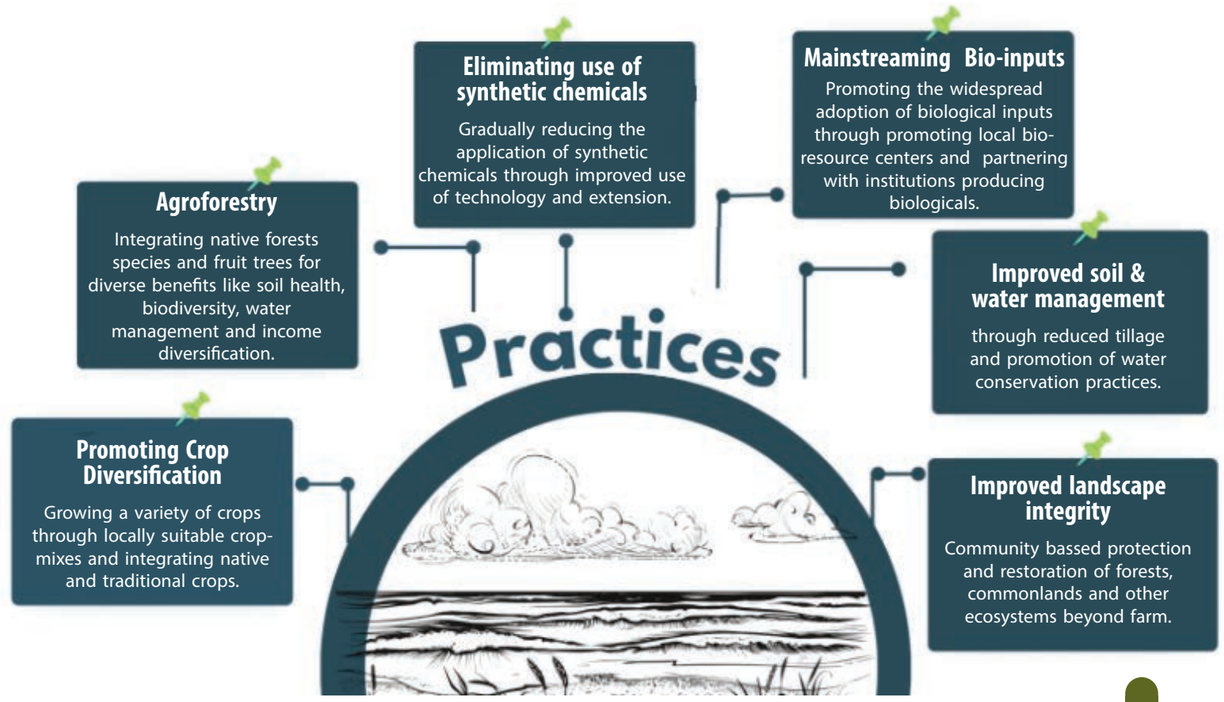
This inequity is further exacerbated by perverse subsidies. India's fertiliser (Urea and DAP) subsidy bill which is nearing ~USD 30 billion, provides subsidy benefits worth ~ USD 10 billion to its top 4.4% farmers. Hence, the input usage is skewed disparagingly towards medium, semi-medium, and large farmers.

Advancing large scale regenerative agriculture is vital to ensure India's production systems sustain and thrive. However, considering the diversity and complexity of agriculture systems in India,



advancing regenerative agriculture needs to be heavily contextualised and factor in the below aspects to make it work.

- Regenerative production system cannot exist in deteriorating landscapes hence, landscape centricity must be core in establishing regenerative approaches in India. Landscape level initiatives (like Regenerative Production Landscape Collaborative, Madhya Pradesh) need to be supported by long term support to create landscape level governance for collective action.
- Farmer centricity is paramount – existing approaches put the most burden on the farmer and are extractive, hence stakeholders particularly private sector not only needs to share farmer's risks but also respect farmer rights and their data integrity.
- Landscape actors (government, civil society, markets, enablers) must invest in processes and not outcomes. The multiple regenerative agriculture frameworks focus on outcomes and hence carry an



extractive and exploitative connotation. There needs to be a shift away from frameworks to contextualised practices and processes.

- 80% of the outcomes can be covered by 20% of the indicators. Complex frameworks dilute the end result – which is benefitting the farmer and the landscape within which they operate. The key is to define and align on those 20% indicators. Everything cannot be measured and actors especially markets and donors need to align and reduce this complexity.
- Lastly – focus must shift to 'how' and 'what'– contextualising the frameworks and how they will be implemented/ adopted is important. This is where landscape actors or conveners become important. There is no substitute to strong local capacities, collective action and leadership.

Abhinav Sen
Senior Program Manager
Regenerative Production Landscape Collaborative (RPLC)
IDH India Hub Pvt Ltd

Abhinav works with IDH and leads the Regenerative Production Landscape Collaborative (RPLC) in Madhya Pradesh, India. RPLC is an innovative governance initiative co-founded by Laudes Foundation, IDH, and WWF-India. RPLC aims to create a systems-level change through an approach which combines advancing regenerative agriculture and landscape restoration through a strong multi-actor governance system.

BHIL ADIVASIS OF ALIRAJPUR AS PIONEERS OF REGENERATIVE AGRICULTURE

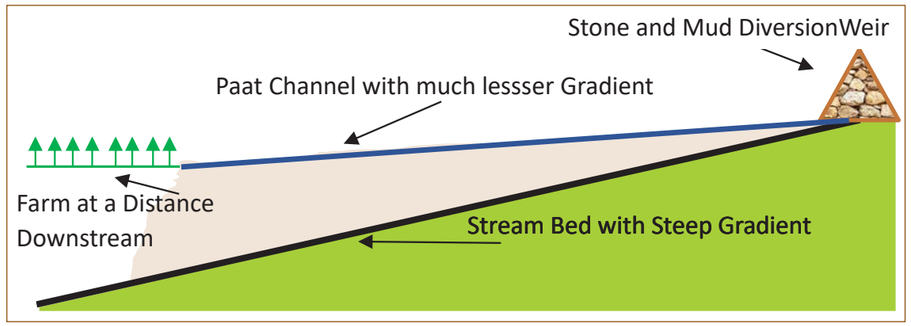
Regenerative Agriculture has come to the fore as a means of mitigating climate change in recent years because of its potential for sequestering carbon. However, indigenous people all over the world and especially the Bhil Adivasis of western Madhya Pradesh have been practicing this form of agriculture for centuries together. The members of the Khedut Mazdoor Chetna Sangath (KMCS) in Alirajpur district of Madhya Pradesh have been doing regenerative agriculture for the past four decades with help from the NGOs, Dhas Gramin Vikas Kendra and Mahila Jagat Lihaaz Samiti.

The main components of Regenerative Agriculture are as follows –

1. Afforestation to ensure adequate supply of composted mulch for augmenting the supply of manure from livestock. This is crucial as without adequate organic fertilisers it will not be possible to raise the organic carbon content of the soils and their productivity. Afforestation by itself also aids greatly in sequestering carbon. The KMCS organised the Bhil Adivasis in about fifty villages into small groups of ten to twelve farmers each who then pooled their labour and cooperated with each other to undertake social fencing of their forests so as to prevent them from degradation. This was in fact a revival of a traditional labour pooling system called Dhas from which the name of the NGO Dhas Gramin Vikas Kendra is derived. This system had fallen into disuse because the intrusion of the market economy and the destruction of the natural resource base had destroyed community institutions. Considerable effort was expended to revitalise this system and it has paid rich dividends. The traditional Adivasi knowledge regarding afforestation is that instead of planting saplings which struggle to survive in the summer heat it is better to socially fence off forest areas and let the root stock regenerate. So, this is what was done. Teams of villagers which included women got together to ensure that the forests were protected and regenerated.

2. Soil and water conservation is the second important aspect of regenerative agriculture because they ensure the preservation of soils with their nutrients and also the easy availability of water for irrigation, often by gravity from flowing streams, which obviates the need for using fossil fuel energy to pump water up from deep aquifers on to the fields. This water use system at first glance appears to make water scale steep hills to irrigate fields, takes advantage of the peculiarities of the hilly terrain to divert water from swiftly flowing hilly streams into irrigation channels called paats. The paats work on the principle of differential gradient. While the stream bed itself has a steep gradient, it is bunded with stones and mud at an upstream point well above the farms in the village to construct a diversion weir. The paat channel that is taken off from the weir along the side of the stream has a much lower gradient and so gradually it gains in elevation with respect to the stream bed as the stream progresses downstream. The crucial knowledge input here is to decide the exact point upstream from the farms where to build the diversion weir and draw the channel so that it reaches the farms. The Adivasis pinpoint this location without the use of any measuring instruments and that is their great achievement. The paat system is schematically shown in Fig.1.

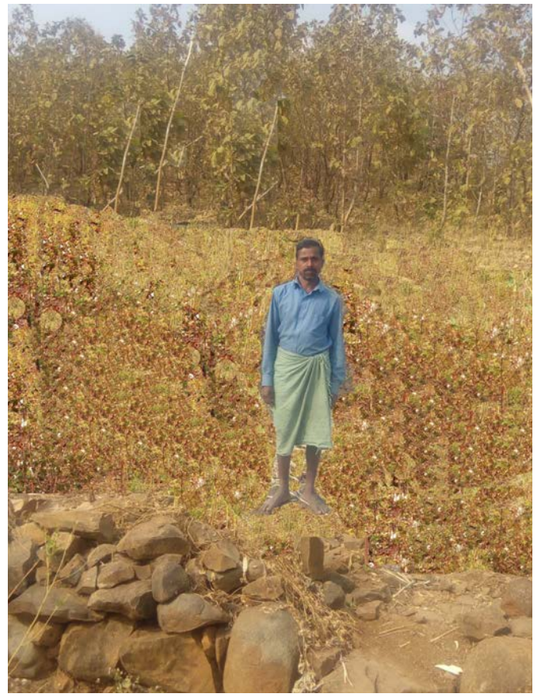
Fig. 1 Diagram of Paat System of Irrigation



The Bhils have developed and refined the paat system, a practical and ecologically sound method of water management. After harvesting the kharif crop, one member from each family is spared to join others in the repair of the water channel and construction of the diversion bund. The process is quite a laborious one. The diversion bund across the stream is constructed by piling up stones and then lining them with teak leaves and mud, to make them leak-proof. The paat channel has to steer through the nullahs (deep ditches) that join the stream, before reaching the fields. Stone aqueducts are built to span these nullahs in a manner similar to the diversion bunds. Particularly skillful is the manner in which the narrow channels have been cut in the face of the sheer stone cliffs. The villagers irrigate their fields by turns. The channel requires constant maintenance and it is the duty of the family irrigating its fields on a certain day, to take care of the paat for that day. It takes about two weeks to get the paat flowing and the winter crop is sown in early November. Thus, this is a communitarian effort that binds the whole village together while at the same time conserving the environment and promoting regenerative agriculture.

3. The third aspect of regenerative farming is the conservation and propagation of seed diversity both within and across species. This is extremely important both for sustainability of farming and the control of it by the farmers but also for the nutritional value of the food being consumed by human beings. The Bhil Adivasi farmers had traditionally a wide variety of seeds ranging from millets, sorghum, maize, pulses, oilseeds and vegetables. However, with time this diversity had got eroded drastically due to the intrusion of hybrid varieties. This was sought to be reversed from 2015 onwards as all the indigenous seed varieties were collected and grown on a conservation plot in the campus of the Rani Kajal Jeevan Shala school and on the farms of a few farmers. More than 40 varieties of indigenous land races have been conserved as a result of this programme and more and more farmers are gradually spreading this movement.

All this is epitomised by the farmer Pavlia of village Vakner who is an unsung hero of our times. He is a Bhil Adivasi resident of Vakner village in Alirajpur district. He is standing on his farm on which he grows organic and indigenous varieties of sorghum, maize and cotton. He has a stone bund which prevents soil erosion in front of him and a forest that he has protected behind him. There is no grid electricity as his farm is deep inside the forest and so he uses a solar panel to meet his minimal needs for lighting. There is no mobile connectivity so he does not have a mobile. There is no road connectivity either so



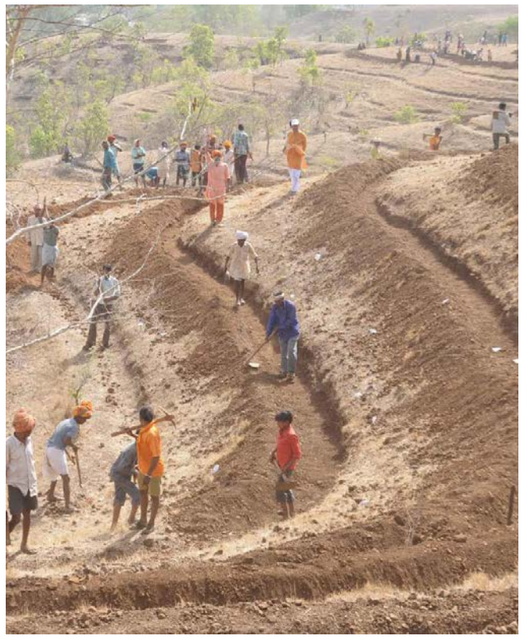
he does not have a motor vehicle. Obviously, there is no television also. He uses the traditional paat technique to irrigate his farm through gravity. He is free of the travails of the market.

His farming is low cost and since it is regenerative, it is highly productive. He does not chase money, of which he earns enough for his subsistence from selling minor forest produce like mahua, karanj, behera etc from the forests he has protected. So, he does not face the struggles that chemical farmers are saddled with. What are most important are his worldview and lifestyle which are in harmony with nature. Consequently, he is hugely carbon and water positive providing invaluable ecosystem services to society to combat climate change through regenerative agriculture. Sustainability is a complex issue. Modern development based on advanced technology invariably is associated with ecological

destruction and socioeconomic inequality. There is no way in which everyone can enjoy advanced technology and also save the environment at the same time.

Ultimately, it is all about our attitude to physical labour since regenerative agriculture is localised and so labour intensive. Is physical labour liberating or does it limit our freedom? Pavlia and others like him in Vakner have taken a conscious decision to live lives of subsistence. They can live a modern life enjoying bikes, mobiles, TVs, etc., if they want to, by migrating seasonally to cities for work as many other Adivasis in his village do. But they are the few who have analysed the situation and decided that their labour-intensive lifestyle is better. They do use modern technology selectively, but it is peripheral to their existence. They are veteran comrades of sustainability and have retained the core of the anarchist critique of modern development. While I have not been able to live that life after 1995, Pavlia and some others in Alirajpur are still carrying the torch. We have to try and become carbon and water positive like him which is possible even after using modern technology much more than he does. We may not be as good as him as far as sustainable living is concerned but we can certainly do better than what we are doing at present by supporting his regenerative agriculture by consuming its products.

~ Rahul Banerjee



EMBRACING THE FUTURE OF AGRICULTURE:

EXPLORING THE ADVANTAGES OF REGENERATIVE FARMING, A POTENTIAL SOLUTION

In today's world, where environmental worries are on the rise and the consequences of climate change are becoming more evident, the agricultural industry faces a crucial decision. Conventional farming practices, with their heavy reliance on chemical inputs, monoculture cropping, and extensive land use, have often been criticized for their detrimental effects on soil health, biodiversity, and the broader ecosystem.

That's why to create a sustainable future, regenerative farming has emerged as a beacon of hope for a healthier planet. Regenerative farming is a philosophy and set of practices that go beyond sustainable agriculture. It seeks to rejuvenate the land by working with nature rather than against it, by mimicking the natural ecosystems and working with, rather than against, nature's inherent processes. The core principles of regenerative farming include: Soil Health, Biodiversity, Water Management and Holistic Livestock Management.

MUKTI's Work

In the modern era, a good life can only be achieved through healthy food intake, which paves the way for a healthy life. Therefore, Mukti aims to create an ecosystem of Regenerative farming that not only helps sustain the long-term needs of the environment but also supports the livelihoods and nutritional needs of the population.

To implement this goal, Mukti, in collaboration with United Way Kolkata (UWK), is working on regenerative farming on 550 farmers' land in two GPs that is Nagendrapur and Kankandighi, Raidighi, Sunderbans.

They follow many practices that fulfil a regenerative philosophy since 2009. In 2009, the arable land of Sundarbans was rendered uncultivable after the salinity floods due to the effects of the Aila Cyclone. Recultivation of those saline lands through organic farming and the socio-economic development of the low-income farming community of the Sundarbans River Basin was started in 2009. The project started, through various activities, to fulfil a regenerative philosophy like cover cropping, reduced tillage, crop rotation, crop diversity, holistic livestock management, etc.

- **Cover Cropping:**

  Cover crops manage soil erosion, soil fertility, soil quality, water, weeds, pests, diseases, biodiversity, and wildlife in an agroecosystem.

Sesbania, green gram, mustard, etc. are cultivated as cover crops. Mukti has encouraged the farmers to comply with cover cropping and they are successfully doing the cover cropping.

- **Crop Rotation:**

Crop rotation contributes to improved soil structure by enhancing water infiltration, aeration, and nutrient distribution. Optimizing water usage through diverse crops with varying root systems aids in the conservation of soil moisture.

Also, this practice allows farmers to diversify their income by cultivating different crops, contributing to financial stability.

The crop rotation pattern followed by their listed farmers in their project area is: paddy is the major crop during the Kharif season, besides some vegetables like okra, brinjal, some cucurbitaceous crops, etc. also cultivated during Kharif, then potato/ pulses/oil seeds and also some vegetables like tomato, chilli, some cole crops, etc. are cultivated during the Rabi season. During pre-kharif watermelon, muskmelon, cucumber, some vegetables, and fodder crops, etc. are cultivated.

- **Integrate Farming:**

Integrated livestock farming system is based on the philosophy that "there is no waste" and "waste is only a misplaced resource that can be transformed into another useful material for another purpose". It is a way of efficient waste utilization generated under different farming systems and assists the farmers in becoming self-sufficient and self-reliant.

In their project area, most of the farmers have small and fragmented land holdings (< 1 ha) and the area under crop cultivation is also shrinking day by day resulting in a decrease in productivity from different crops. In agricultural operations, the sowing and harvesting of crops are seasonally dependent. Integration of the livestock sector with different farming

Cover Cropping

Cover Cropping

systems can provide income and employment around the year and can meet the household's requirements of the farmers with small land holdings. That's why MUKTI takes different approaches under the Integrated Livestock Farming System in collaboration with UWK –

- **Crop Livestock Farming System:**

In an integrated crop-livestock farming system, agricultural crop residues are used for feeding animals, while livestock manure increases agricultural productivity by improving soil fertility and fortifying nutrients that reduce the use of chemical fertilizers. A healthy cow excretes over 4,000-5,000 kg of dung, 3,500-4,000 L of urine on an annual basis which can be applied as manure to the fields as a replacement of chemical fertilizers after proper composting.

- **Crop Livestock Fishery Farming System:**

In this system, the crop residue i.e. paddy straw after harvesting is fed to cattle. Livestock manure is applied to increase soil fertility by increasing the availability of nitrogen and phosphorus in the soil. On the other hand, fish production is associated with paddy fields where rice fields provide fish with good planktonic, periphytic, and benthic food. In livestock plus crop farming systems, fish are raised without any additional feed, with manure from livestock used to initiate the growth of zooplankton and phytoplankton. Fish like rohu, katla, mrigal, grass carp, common carp, and silver carp are best taken in an integrated system.

- **Crop Livestock Backyard Poultry Farming System:**

Duck/Pig/Poultry plus fish farming system reduces the cost of fertilizers and feeds in fish farming. In their project area, most of the farmers follow this system, Poultry is reared near or over the fish ponds in which the poultry excreta will directly drop into a fish pond and get recycled which helps in better growth of zooplankton and phytoplankton which are eaten by fish and in this way, the resources get recycled.

Increase Soil Fertility:

Regenerative agriculture is not a specific practice itself. Rather, proponents of regenerative agriculture use a variety of sustainable agriculture techniques in combination. Practices include recycling as much farm waste as possible and adding composted material.

For that MUKTI, in collaboration with UWK has taken several initiatives, which are as follows:

- Vermicompost Pit Construction:

  Listed farmers have been provided with vermicompost pits so that farmers can produce vermicompost on a large scale and use it on their land and can increase income by selling surplus vermicompost manure. Vermicompost contains 13 of the 16 essential plant nutrients, which are also helpful in increasing soil fertility and increasing crop production. UWK has supported 500+ such vermi-compost piths to the selected farmers those are producing enough vermicompost for regenerative farming and taking care of the soil fertility.

  Not only is vermicompost peat provided, but farmers are also assisted with vermicompost production training and necessary earthworms.

- Other bio manure preparation:

  Mukti, in collaboration with UWK, imparts training to farmers on the preparation of various types of bio-manures such as Jeevamruth, Gada Compost, Panch Govya, Waste Decompost, etc. which help in building soil health.

- Microorganism culture:

  A microorganism culture lab has been set up in the project area, where 17 microorganisms including TVS, B.B, P.L T.H, T.A, etc, are cultured, and distributed to the listed farmers.

  As soil health improves, input requirements may decrease, and crop yields may increase as soils are more resilient against extreme weather and fewer pests and pathogens.

Water Management:

MUKTI has taken steps to rehabilitate farmers' ponds to conserve rainwater so that farmers can farm on that water. Also, as paddy requires more water during the Rabi season, farmers are encouraged to grow mug or mustard, etc. instead of paddy. In addition, farmers are trained on irrigation methods that will result in less water consumption.

Bio Manure Preparation

Conclusion:

Regenerative farming offers a promising path toward a more sustainable and resilient agricultural future. By prioritizing soil health, biodiversity, and holistic management practices, regenerative farmers are not only producing food but actively contributing to the restoration of our planet. As awareness grows and more farmers embrace these principles, regenerative farming has the potential to transform agriculture into a regenerative force for the benefit of present and future generations. It is a holistic and hopeful approach that holds the key to creating a thriving and harmonious coexistence between agriculture and the environment.

MUKTI strives to encourage farmers, through various supports, to follow the philosophy of regenerative farming and create a healthy planet. Mukti in collaboration with UWK has pledged to convert 1000 bighas of cultivated land to organic farm land to make those areas independent of chemical pesticides, herbicides, fertiliser. The bio-manure prepared by the farmers themselves are now helping those farmers in regenerative organic farming. Mukti is also working towards converting a 10 KM area with more than 1200 farmers family to convert the village as Bio-Village.

~ Debabrata Halder,
Lead Agriculture Reforms & Organic Farming, MUKTI

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