

## Natural farming, tribal farming

In major parts of India, agriculture is in crisis, with very low returns and large-scale destruction of cropped lands. Conservation agriculture can help small and middle farmers escape the downward spiral that impoverishes them even as it destroys the soil and ecosystem, writes **Vidhya Das**. Tribal farmers in particular have an intuitive understanding of natural farming techniques, Agramee discovered during its nascent initiatives in organic conservation agriculture with tribal farmers in Orissa

It's a long, arduous struggle getting something out of the red-brown soil that covers most of Kashipur in Orissa. And a quirky, lateral approach does little to help, as most people, including my colleagues, view anything unusual in cultivation practice with deep suspicion. Sumani is my strongest critic, and a follower. I impressed her with vermiculture and she took a pot of worms to start her own. She even took a bottle of ***panchakavya*** from me and tried it with great enthusiasm, and, I hope, success on her vegetable patch.

Vermicompost is all very well under ideal conditions -- a dairy with stall-fed cattle, a largish campus that did not need to grow food for the family and so could afford a fair portion of area for trees that produce leaf mould and mulch, sufficient water and other resources. But what about small farming families with less than 2 acres of non-irrigated uplands? These families find it hard to keep vermicomposting going, and the risks are high: they can be attacked by pests; suffer too much or too little watering; the organic matter has to decompose just right; you have to have the right mix of cowdung and partially decomposed matter for the worms to thrive... Sumani herself found it difficult to get her culture right; she managed only after replenishing her supplies several times from our carefully monitored stock of 'local' non-exotic worms.

We had been experimenting with organic farming, permaculture, double digging, and other techniques for some years. The red inorganic soil of Kashipur gives a little, grudgingly, and then holds back. Just making compost requires a great deal of effort in terms of time and labour. You have to water it regularly to keep the moisture levels right, and water is at a premium in the rolling uplands. We had made several compost heaps, and they just grew; they did not decompose until the rains came. I wondered how one family could do all this and manage the huge cost in terms of labour. How

would they maintain moisture levels for good compost? And in the quantities required?

Very often, farmers do not factor labour costs into their production systems, especially small and marginal farmers. But the whole family works on the farm -- children, women, even the elderly. Then, because returns are too low to sustain them, they work on the farms of large farmers; here too, the real labour costs are not factored in.

At the first opportunity, farmers give in and take to chemicals, starting up the cycle of dependence and debt. Or, they opt out of their traditional cropping patterns and move to eucalyptus plantations, which hold even more risks and limitations.

When the great Masanobu-**san** (Fukuoka) died, I felt compelled to re-examine his practical philosophy. Natural farming, farming in nature's image, seemed good in the pages of the exciting book ***One Straw Revolution***. But I wasn't a rice farmer, and we did not have rice lands. Moreover, even the concepts of organic farming with input substitution were difficult for my colleagues to swallow. How then would they react to his major tenets of no tilling, no weeding, no fertilisers (not even organic ones), and no pesticides?

I had chosen an unused patch of the Agramee campus land. We had just cut the grass. Just sow the paddy, I told Ratha, at the same time and the same way, just before the rains, as you do in your fields. He wanted to dig. This was upland paddy that did not require standing water. We compromised. We raised beds 4-5 feet in width, threw soil from the furrows in between on to the beds on either side, sowed our paddy, and mulched all the beds with leaves. This successful first step emboldened me and we made similar beds with finger millet and foxtail millet.

The paddy did indeed sprout! When I peered at the neighbouring fields, my no-till methods compared very well. Sumani made special trips to monitor my fields, and congratulated me on my success. But her scepticism returned when we found that the millets had done poorly. Perhaps we had sown them late...

I had cut and mulched weeds on an unused bed. In some of the beds, the weeds had grown enough. In others, we added some to provide soil cover, spread EWM, threw soil from the furrows on either side on to the beds, and transplanted cabbage, brinjal and chilli seedlings. The cauliflowers died, but the chillies and brinjal did well. Long after other beds of chilli and brinjal, planted at the same time, had exhausted, mine survived and continued to yield. No-till needs understanding and patience. Gradually, the whole campus turned into a zero-tillage zone; even my colleagues grudgingly began showing a little acceptance of the approach.

Disaster struck in the form of expert advice. A group of experts saw our fields and were

shocked by the overgrowth and apparent disarray. The beds were dug up, weeds pulled out and put into compost bins, and soon there were perfectly straight rows of cabbage and onions, watered in neat little furrows. They got good results from the soil that had retained its humus and organic matter. But this was an exception that only proved the value of conservation agriculture, as yields dropped again the next season.

After returning from a farmers' fair, a member of the visiting team wrote me about Raju Titus who had a 'natural farm' in Hoshangabad, Madhya Pradesh, which Masanobu Fukuoka had visited and helped design. Some of us went to see the farm. That was the turning point. Raju's fields of golden wheat put the neighbouring fields to shame. He produced enough for his family even though half his land was covered with **subabul** and other fruit trees. The leaf fall enriched his land; the fuelwood he gave away to people from neighbouring villages. His wife and just one helper managed almost the entire agricultural operation. While Raju explained the theoretical aspects, his wife gave us all the practical insights.

We returned convinced that this was the future of farming, and gradually we began to turn all the cultivated land on campus into zero-tillage, natural farms. We also felt we should help the local community benefit from this method, and, seeking to reach out to the tribal farmers we worked with, we invited Raju for a workshop. Raju is a man of few words. He briefly explained his methods and their value to farmers, and then demonstrated the techniques in practice. The farmer-to-farmer communication worked wonders. During the course of the workshop, 15 farmers declared that they would like to turn their farms into zero-tillage natural farms. This was success beyond all expectations; we eagerly began the process of expanding our experiments beyond the campus.

But it was not an easy task. Tribal regions in south Orissa, where Agramee works, are hilly upland areas where shifting cultivation has been practised to the point of disaster. Heavy rains a few years ago had caused huge landslides, destroying both upland and lowland crops. The lowlands, where the best paddy in the region used to be cultivated, were now quite useless.

Land is divided into four zones in this region: irrigated lowlands, backyards, non-irrigated croplands, and dongar or hilly uplands. With the entire terrain in undulating relief, the first category of land is at a premium. It is painfully carved out of hill slopes and narrow stream beds through years and years of backbreaking work with bullocks and plough. When the uplands are denuded, a single day of heavy rains can destroy the crops so lovingly nurtured on them, throwing the farmer into deep despair.

Governments have also been very unkind in compensating farmers for their losses.

Although an official compensation is declared for farmers who have lost their crops, it is much too little to be of any significant help, and is often badly handled.

Even so, there is opportunity too. '**Podu chaso**', as slash-and-burn cultivation is called in tribal regions of Orissa, is significant for the diversity of crops it has traditionally helped sustain, as also the diversity of cultivation practices it has generated. Crop rotations, intercropping, and other sustainable agricultural practices are a part of the inherited knowledge system of the Podu farmer. The rice varieties that have been preserved by tribal farmers in Orissa's undivided Koraput region are amazing. There are several varieties of short-duration and long-duration upland paddy that grow on the middle region slopes. Some of the most exquisite varieties of scented rice are grown here, the most famous being 'kala jeera', so called because the paddy is black in colour before it is de-husked. Apart from this, there are short- and long-duration varieties of ragi and the less common millets including foxtail millet, pearl millet and sorghum. Amongst pulses, they grow several varieties of broad bean, arhar, cow pea, rice bean, urad, and a local variety commonly called 'baeil'.

Not all of this is grown on hill or mountain slopes, the typical shifting cultivation or swidden land. For example, most scented varieties of paddy are lowland varieties. Not all of the land under shifting cultivation is mountain land either. But, it is the entire system of agriculture practised by the tribal communities that has helped preserve this rich diversity of crops, as also diversity of cultivation, as different systems are practised on different types of land and different types of soil. This knowledge system is of great value today, when the genetic wealth of plant resources is being usurped by multinational corporations and their aggressive market strategies.

The Podu system has developed in tune with the climatic conditions of the southern Orissa districts. Here, monsoon is the main agricultural season. It is characterised by a thin continuous drizzle for four to five months in the year. This provides the moisture necessary for hill slope cultivation, without the soil being washed away to any significant extent. Shifting cultivation crops are completely attuned to this sort of rain. Their shallow root zones thrive on the thin soil layers, while their moisture tolerance enables them to survive and produce a bountiful harvest. The burning enriches the potassium content of the soil, whilst also controlling pests and weeds.

Tribal knowledge systems also have a deep understanding of the crop rotation practices required to maintain shifting cultivation cycles at optimal level. In lowland paddy areas, tribal communities have developed indigenous systems of water management and crop optimisation, combining long-duration and short-duration varieties that enable crops to withstand the water currents of the monsoon in the valley, while optimising land use.

The typical shifting cultivation of tribal communities in southern Orissa is practised on primarily two categories of land:

**Medium land:** This land has a slope ranging from 3-10 degree gradient. Here, rice and millet, followed by a last niger crop, are cultivated annually under rainfed conditions. The land is cultivated in three- to four-year cycles, with equal fallow periods. This land is highly eroded, with rills and gullies steadily eating into the cropped area. Most of the medium lands are under private ownership.

**Upland:** These are hilly regions with slopes ranging from 10-45 degree gradient. With sufficient fallow periods, this land has good regenerating capacity and productivity. But due to various reasons, the length of the fallow period has been decreasing, leading to landslides during the monsoons which inundate lowlands and result in huge crop losses. Most of the uplands are referred to as "uncultivable wastes". These are government lands on which nobody is allowed ownership except under special consideration. This special consideration can take different forms.

In 1993, the government passed an order for upland slopes to be recorded in the name of landless tribals as a special provision under the International Fund For Agriculture Development (IFAD)-funded Orissa Tribal Development Project (OTDP) in Kashipur block. The project had several forward-looking and pro-poor provisions, the major objective being to improve tribal livelihoods through agricultural and market development. This was a landmark legislation, in which title deeds were sanctioned to landless tribal families on slopes between 10-30 degree gradient. The revenue department was required to record the names of both husband and wife on the title deed, providing economic security to women as well. Under the Land Acquisition Act, special provisions also facilitate acquisition of these lands by industrial and mining companies.

A major thrust of the OTDP programme was agro-forestry, wherein hill slopes under shifting cultivation were divided into three zones based on gradient. The 0-10-degree slope was marked for annual cropping, with soil and water conservation measures being undertaken; the 10-30-degree slope was marked for agro-forestry; slopes above 30 degrees were marked for plantation. Hill slopes were divided into strips of 1 hectare and distributed to tribal families with priority being given to the landless. The zone of 0-10-degree slopes was surveyed and settled with ownership rights given to the tillers.

Soil conservation measures were undertaken, like constructing contour stone and vegetative bunds on the hill slopes, checking gully and ravine formation through appropriate drainage treatment and other erosion control measures. Fruit-bearing trees like mango, litchi, guava and cashew were introduced as part of agro-forestry.

Miscellaneous plantations were taken up on slopes above 30 degrees. Using sophisticated equipment, land survey and settlement processes were completed in 400 villages in Kashipur, and **pattas** distributed in over 150 villages. Local NGOs and tribal leadership were engaged in the decision-making process, to minimise conflict.

Initially, the tribals adopted this model enthusiastically. The land was settled and **pattas** were issued after the state government passed an order that this form of agriculture should be applicable to all tribal areas. However, on the ground the programme was poorly planned and implemented, and the initial impact was not sustained. The barren hill slopes, where a lot was spent on agro-forestry and soil conservation, now bear testimony to the inadequacy of measures aimed at reclaiming wastelands in high-relief shifting cultivation areas. Admitting its failures, the IFAD evaluation report states that the OTDP is a classic example of a development intervention in which the 'hardware' side of development was given far more importance than the 'software' side, both during design and implementation.

Although initially the settled lands and soil conservation measures seemed to have worked, very soon the tribal practice of slash-and-burn cultivation negated much of the gains. Even though ownership is now recognised, the soil loss and degradation of land resources continues. This also shows that the technology selected to provide viable and eco-friendly alternatives to shifting cultivation was inappropriate.

Several watershed projects have also been taken up under various government programmes in tribal regions. These projects, which saw substantial investments in earthworks, water resource development, manpower, etc, have had hardly any impact; nor have they done much to establish the viability of the soil conservation and erosion treatment model for environmentally degraded upland tribal areas. A few watersheds have helped a fraction of the tribal community improve their livelihoods. But by and large, this fraction does not include the poorer sections. Furthermore, the land development measures have done little to improve soil fertility, decrease topsoil loss or help establish a healthy vegetative cover.

Several reports indicate the multi-level failure of the watershed programme, and many of the causes of this failure are attributed to poor levels of participation. However, there has been little review of the techniques and technology used for the treatment of watersheds, and linking the interventions to the livelihood needs of poorer sections of the community. Thus, while NGOs fare better thanks to their increased sensitivity towards the needs of more marginalised sections, the cost-benefit ratios for watersheds still raise many questions.

According to a Planning Commission report, the 16.5 million hectares treated under the

micro-watershed approach are not reflected in the net sown area which has stagnated at around 142 million hectares over the last 20 years. According to the Planning Commission: "Although the ministries of agriculture and rural development have implemented watershed projects for more than a decade, evaluation reports have shown that most projects have failed to generate sustainability because of the failure of government agencies to involve the people. Most government watershed development investments have yielded disappointing results given the vast resources allocated."

This is especially unfortunate in upland tribal areas where the pace of environmental degradation is accelerating, with accompanying impoverishment and distress among local communities. The poor outcomes of the watershed approach do little to build the faith of tribal people who respond in a superficial manner in anticipation of wage payments as some succour in their poverty-stricken lives. Watersheds also fail to recognise traditional knowledge systems and do little to promote indigenous crop varieties. There is an urgent need to address all these problems for any level of people's involvement and sustainability.

What could the options in such a scenario be? Was it the technology or the 'software' (as the IFAD report mentions) that failed these poor communities? There is no dearth of government expenditure on natural resource management programmes, and yet poverty increases. Could there be a way where current know-how can be combined with tribal knowledge systems and practices to reverse the ecological destruction, whilst helping improve the livelihood opportunities of tribal communities?

Not just tribal regions but in major parts of India, agriculture is in crisis with very low returns and large-scale destruction of cropped lands. An approach such as conservation agriculture needs to be taken up extensively with small and middle farmers to help them escape the downward spiral that impoverishes them even as it destroys the soil and the ecosystem.

Acceptance of conservation agriculture is much greater among farmers in rainfed regions. This could give rainfed agriculture the boost it needs, as a major portion of arable land in India is cropped primarily under rainfed conditions. Conservation agro-ecology systems could also be designed combining agriculture and plantation crops to bring about an overall surge in ecological gains. When integrated with local experience and wisdom, this approach can be adapted to improve agricultural production in rainfed agricultural uplands, irrigated backyard gardens, and commons, under the management of women's groups and the village community.

As the farm sector goes into a downward spin, the government's actions to bail out farmers takes the form of corporatisation, which allows agri-business companies,

retailers and food-processing companies to enter into agreements directly with farmers. This, it is presumed, will help farmers find ready and reliable markets for their produce. However, failed experiments in states like Andhra Pradesh indicate that, with such 'solutions', farmers bear the final costs and receive very little benefit.

On the other hand, support for ecologically sound measures that help increase the production of food commodities that are in short supply such as lentils, oilseeds and millet, through approaches like conservation agriculture, will help rural communities address impoverishment. Agramee's nascent initiatives in organic conservation agriculture with tribal farmers highlighted the farmer's interest and intuitive understanding of such an approach. Our early mistakes have only boosted enthusiasm amongst them to try again with deeper understanding, the next monsoon. This is where the support and partnership of government is required, for that will enable the positives from our experience to be of use in other parts of the country.

***(Vidhya Das is with Agramee, a group engaged in culturally sensitive and ecologically balanced development of remote tribal communities in Orissa)***

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