

How central Indian tribes are coping with climate change impacts

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Faced with crop losses because of erratic rainfall and extreme weather, tribal farmers of Maharashtra and Madhya Pradesh turn to *bewar* and *penda* forms of cultivation that keeps them nourished all times of the year, but government agencies are bent on rooting out these farm practices

Tribal farmers say *penda* and *bewar* involve no cost or loan, are less laborious, give an assured crop from land considered inferior, and yield more nutritious and varied food than conventional cultivation (Photos by Aparna Pallavi)

Hariaro Bai Deoria should have been a worried person this year—an untimely spell of rain late last October flattened her paddy crop, and her family would have been facing the prospect of a year without food. Surprisingly, the matriarch aged 65 is not that worried. “I still have enough grain left from last year’s *bewar* to last us six months. And we got a good crop this year, too.”

Hariaro Bai is referring to a form of shift cultivation that has been outlawed under the Indian Forest Act of 1927, but continues to play an important role in providing food security to the Baiga tribals living in the Mandla and Dindori districts of Madhya Pradesh. A similar form of cultivation called

penda

is practised by the primitive Madia tribe in the hills of Bhamragadh in Gadchiroli district of Maharashtra. Despite their illegal status,

bewar

and

penda

cultivation practices continue to thrive among these tribes because they involve no cost or loan, are less laborious, give an assured crop from land considered inferior, and yield more nutritious and varied food than conventional cultivation.

Bewar

cultivation is also practised by a significant proportion of the tribal population in Chhattisgarh.

In recent years, tribal farmers who had converted to conventional agriculture are returning to

bewar

and

penda

cultivation in the face of increasingly erratic rainfall patterns and crop losses as climate change makes its presence felt. This cultivation is much more resilient to environmental stress, and gives an assured yield in both low and excess rainfall conditions.

Activists working with tribal communities say that government agencies are mostly either ignorant about these practices or are against them without any proper scientific evidence to support such censure. Madhya Pradesh’s State Climate Action Plan, for instance, calls for policies to manage climate risks for sustainable productivity; the state also has a millet cultivation project, but no government agency has taken steps to study or protect this singularly low-risk cultivation practice that has the potential to meet the food-security needs of a large tribal population in the state. In Maharashtra, which does not even have a climate plan, government agencies are not even aware that such a practice exists, says Ajay Dolke, of non-profit Srujan in Nagpur.

All weather, assured yields

This year, heavy spells of rains and a prolonged monsoon have caused crop damage across the country, but a visit to the *bewar* plots of the Baigas in Madhya Pradesh shows all signs of a bumper crop harvest. “This was a great year for *kutki* (little millet), our main *bewar* crop,” says Lamtibai Rathuria of village Chapwar in Dindori district who has a 2 acre (0.8 hectare) plot, pointing to the heavy heads of the plants bent with grain. “The paddy is gone, but the *bewar* is safe.”

The situation is the same in village Bhangadi in the Bhamragadh hills in Maharashtra. Mangru Karme Pungati, a Madia tribe farmer who grows both paddy and *penda* crops, informs that about half the village’s paddy crop was lost because of erratic rains. “It is our *kohla* (Madia term for *kutki*) that will keep us alive this year,” he says.

A mix of millets, corn, legumes and vegetables are grown in a single plot by tribal farmers practising shift cultivation. Lamtibai explains how differently [bewar](#) and paddy respond to weather conditions: “If there is less rain, the paddy wilts, but the [bewar](#) gives a moderate yield. If there is excess rain, the paddy gets pests but the [bewar](#) gives a bumper yield. If it rains at harvest time, water accumulates in the paddy farms and the grains rot. But since the [bewar](#) plots are on steep slopes, rainwater drains off and crop damage is very little.”

The only danger to **bewar** crops is sudden, heavy rainfall at the very start of the season because the seeds get washed away, explains Itwari Dewadia of village Talaidabra in Dindori district. “But if there is gentle rain for the first week or so, the plants get properly rooted. After that rainfall is no worry.”

In recent years, there have been repeated instances of monsoons starting late with sudden heavy showers; many villages lost their *bewar* seeds. Communities have adapted by setting up stronger seed networks between villages. “A decade or so back, if all farmers in a village lost their seeds, they would give up. But now, we arrange to get seeds from other villages so that we can at least continue this cultivation the following year,” says Itwari. Non-profits like Mandla-based Nirmaan have also lent a helping hand in forming these seed networks.

Bewar crops avert starvation

Bewar comprises mixed cultivation. Baigas grow as many as eight to 10 varieties of millets, corn and five varieties of legumes in a single plot. Madias grow five to six millets, apart from three to four varieties of legumes. Indian sorrel, which provides greens as well as oilseeds, and several varieties of vegetables are also grown (see 'Security, variety, nutrition'). This mixed cultivation not only prevents pest attacks, but also protects against total crop loss.

It works in two ways. Baigas, who have highly developed methods of rainfall prediction (see 'Baiga weather science') alter the mix of crops according to expected rainfall. “This year we sowed more

dongar kutki

and

kaang

(foxtail millet) rather than other millets, because these thrive in high rainfall," says Tiharu Dhondia of village Garjan Beeja in Anuppur district, "When less rain is expected, we sow more

mandia

(finger millet),

salhar

(pearl millet variety) and

jowar

(sorghum)."

Madias do not have traditional knowledge of weather prediction, but they have arrived at a mix that works in all rainfall conditions. "We plant about 50 per cent *kohla*, and the remaining four millets make up the remaining 50 per cent," says Pandu Samru Jetti of village Bhangadi. "With change in rainfall, the yields of individual crops rise and fall, but the overall yield remains stable."

Tribals feel that **bewar** is vital for their survival. Says Rama Chaitu Durwa of Binagunda village in the Bhamragadh hills where paddy cultivation was started only about four years back, "We are still only learning how to cultivate paddy. It will be years before we develop the skills. Also, we cannot eat paddy all year. We need our **penda** grain, which we like."

"We can live without paddy, but without

bewar

we will starve," says Lamtibai. "Paddy gives only grain—

bewar

gives grain, vegetables and legumes—everything we need."

Absence of scientific research; fallacies abound

Surprisingly, while government agencies have gone to much trouble to root out this form of cultivation, no agency in either state has ever taken the trouble to actually undertake scientific study of its merits. Both O P Dube, principal scientist at the Regional Agriculture Research Station at Dindori, and G R Tidke, principal scientist at the Gadchiroli Krishi Vigyan Kendra, admit that while their organisations are opposed to this farming practice, there is no proper research work to back this stand. State policy on the subject appears to be driven by a predetermined mindset rather than facts. "There is no government decision and there are no projects undertaken to study this practice," says Tidke. "Anyway we are concerned with the masses, not little pockets," he adds. Dube says that his organisation does not approve the principle of leaving land fallow. "We need to maximise yields, and that can only be done by taking two crops on all agricultural land each year," he says.

The result is that there is a huge amount of misleading information doing the rounds in official circles regarding bewar and penda cultivation. The most popular myth is that this cultivation destroys forests, borne out by the misnomer "slash and burn cultivation".

Tribal farmers trash this myth. "We only fell and burn the undergrowth, not big trees," says elderly Gunthia Dewadia of Talaidabra village. "Felling large trees is very hard work, and burning them also burns the soil and makes it unfit for cultivation," he says. Also, there is no reason to fell large trees as most families have three designated plots of land for cultivation, which they cultivate in a cycle for three years at a time, says Naresh Biswas, Mandla-based researcher from the non-profit Nirman, who has researched bewar cultivation for more than a decade. "After six years of being left fallow, these land parcels only have shrubs and young saplings."

A second myth is that **bewar** cultivation, which is carried out in steep slopes, causes soil damage through erosion, but the fact is that this cultivation is till free, and hence far less intrusive than conventional agriculture. "We do not plough the land because that will loosen the soil and the crops will collapse," says Itwari of village Talaidabra in Dindori district. "We just burn the undergrowth and sow seeds in the fertile layer of ash." This kind of cultivation, says he, requires very low labour and hardly any equipment. "We do not need even **hal bail** (bullocks and plough)—a sickle, an axe and a **khanti** (crow-bar like tool) are enough."

[Climate change, revival, innovation](#)

Another important government-sponsored myth about shifting cultivation is that most tribals have given it up long ago as outdated. Farmers disagree. Not only are

bewar

and

penda

cultivation practice thriving in the hilly parts of Central India, there is an active process of innovation on to adapt to changing circumstances.

What is more, faced with repeated losses in conventional cultivation of paddy and soybean, and the high cost of labour and inputs, farmers are returning to these methods. In Bhamragadh, the cost of labour for paddy cultivation is eating into the Madias' precious bamboo felling wages—their only source of cash. Raju Chimma in Laheri village, whose parents gave up

penda

cultivation after migrating from Chhattisgarh, is trying to learn these skills now. "In the past five years, I lost three paddy crops because of erratic rains," he explains. His young neighbour, Suresh Kudami, whose father-in-law took a Rs 25,000 loan for paddy, is planning to resurrect his abandoned

penda

plot next year. "My brother has already started cultivation on his share of the plot," says he.

Tribal people say *bewar* and *penda* grains can be stored for years without spoiling and that the surpluses in good years gives them a safety net for the lean ones. In Mandla in Madhya Pradesh, Gond tribals, who have no recent history of practising

bewar

cultivation, now want to take it up says Hiralal Sarote of Nirman. "Farmers from several villages have requested for seeds and guidance for starting cultivation on about 50 acres (one acre equals 0.4 hectare) next year," he says. Ramratan Kulaste, sarpanch of village Benitola village in Mandla district, said he will start

bewar

cultivation on five acres next year. "I was amazed at the production in

bewar

plots I visited," says he. "My village has a lot of hill slopes without much forest cover which are lying fallow. I hope others will also want to start cultivation."

This process is also intricately tied up with give-and-take of innovation between communities. In Bowna village in Dindori district, farmers had converted their *bewar* land to commercial pigeon-pea cultivation about a decade back. But in the last two years, they have switched back to *bewar* with seeds from Nirman. "We plant a mix of *arhar* (pigeon pea) and *bewar* seeds for food and cash," says Ramlal Rathuria, resident of Bowna village. "Our paddy crops are failing almost every alternate year, and market food is costly and inferior." On the flip side, many villages are adopting Bowna's technique to increase the pigeon-pea content of the *bewars* to earn some cash income without risking their food security.

Similarly, with shrinking land holdings, communities are innovating to reduce the phenomenon of land being left fallow. In Chapwar village in Dindori district, elderly Ramla Khohadia has just one *bewar* plot. Unable to shift, he cultivates high-biomass cash crops like *ramteela* (niger seed) on his land on alternate years. "In the next year, I burn the biomass and plant *bewar* crops," says he. "The yield is good, and I get enough food for 18 months. Many people with less land are now resorting to this technique."

"If government agencies had bothered to study this cultivation instead of turning away from it, they could have helped with the adaptation process," says Biswas of non-profit Nirman. "Their apathy is forcing communities to struggle with their own limited resources."

Insecure rights

Bewar and *penda* cultivation is carried out entirely in forests, and so the land do not have status of agricultural land. To complicate matters, no government department in either state has tried to get any estimate of the area of land involved or population dependent on it.

Non-profits, however, estimate that both could be considerable. *Bewar* is being practised in a major way by about 50-60 villages in Anuppur and Dindori districts of Madhya Pradesh and *penda* in about 30 villages in Bhamragadh in Maharashtra. "At least six villages in the Aboojh Maad area, part of which is in Maharashtra's Gadchiroli district, are totally dependent on *penda*, and the rest get most of their food from it," says Ajay Dolke of non-profit Srujan, which works among Madias. "It is also practised on a smaller scale in nearly all 109 villages in Bhamragadh. It is very likely also practiced in Madia-dominated tehsils like Etpalli and Sironcha in Gadchiroli district." Apart from this, the Pahadi Korwa tribe in Chhattisgarh also depends on *bewar* for most of their food needs, informs Biswas.

Meanwhile, lack of status and estimates contribute to land insecurity for *bewar* farmers. Forest Rights Act (FRA), which has had a limited success at best in giving land rights to forest dwellers in general, has not succeeded at all when it comes to these land parcels. In Dindori and Anuppur, applications under FRA for fallow land were rejected on grounds of there being no evidence of cultivation. In Bhamragadh, the administration on its own gave FRA claims on paddy land in several villages, with strict admonition to abandon *penda* cultivation. "They are not willing to hear of claims on *penda* land," says Rama Chaitu Durwa of village Binagunda who got five acres (two hectare) under FRA.

Tribals have also faced persecution for practising

bewar

. In Talaidabra, people were beaten up and arrested for

bewar

cultivation in 2005, and live in fear ever since. In Chapwar, Lamtibai and her family have lived in fear the whole of this crop season. "Forest officials were threatening to destroy our crop," says she.

Tribals are now turning to the habitat rights clause in the FRA to ensure rights on this land. In Bhamragadh, an application to this effect was filed collectively by all 109 villages in April this year. Says Dolke of Srujan who facilitated the process, "The livelihood process of the Madias is a complex one involving different cultivation techniques, hunting and gathering. They can't survive without habitat rights which give communities a comprehensive right over the entire resource base, not just cultivated plots." In Dindori, the non-profit National Institute for Women, Child and Youth Development (NIWCYD) is preparing the 55 Baiga villages known as Baiga Chak to apply for habitat rights.

As the world reels under the impact of climate change and increased food security concerns, cultivation practices like *bewar* and *penda* could very well hold the key to food security for the forest-dwelling poor of central India. Activists say it is time government agencies starts studying and supporting them instead of driving them to extinction.

Baiga weather science Baiga tribals have quite a well-developed system for rainfall prediction, according to which they alter the timing and composition of their crops. In **bewar** cultivation, sowing has to be done just before the first gentle showers of early monsoon. This makes accurate prediction of these first showers crucial. Baigas in Dindori district do it with the help of a local tuber known as **baichandi kanda**. "We plant it in our **badi** (vegetable garden) in summer, and when it sends its first shoots up through the ground, we know that rains will be here in a week or 10 days," says elderly Nankibai Dhondia of village Garjanbeeja. "That is the signal for us to start burning the undergrowth to prepare for sowing." Another signal for the coming monsoon is the peepul tree. "When the tree has shed all its old leaves and the process of sprouting new leaves is complete, we know that rains are about two-three weeks away," says Nankibai. These two nature signals taken together usually give a sufficiently accurate estimate, says she. The proportion of different millets to be sown in the bewar is decided through weather prediction too. "In late summer," says Taini Sarjama of Bhalu Khodra village in Mandla district of Madhya Pradesh, "A tiny insect called ghunghuti appears in droves in the open spaces. When there are too many of those, they get in our eyes. That is when we know that it will be a heavy rainfall year, and plant more kutki."

Security, variety, nutrition

The Baigas of Madhya Pradesh sow a mixture of eight to 10 millet varieties in their bewar plots. These include several varieties of **kutki** (little millet), two of **kaang** (foxtail millet), **salhar** (pearl millet variety), **jowar** (sorghum), **mandia** (finger millet) and **sama kodai** (barnyard millet). **Kodai** (kodo millet) is sown separately on tilled land. **Purpuri** (amaranthus) serves for both grain and green vegetable, while **amadi** (Indian sorrel) provides green leaves, oilseeds and flowers for sherbet in summer. Legumes include **arahar** (pigeon pea) for both food and cash and **moong** (green gram), **urad** (black gram), **kurthi** (horse gram), and **rawans** and **jhunjhru** (cow pea varieties). A variety of vegetables including cucumber, beans, local tomatoes and brinjals are also sown as part of the mix.

Madias in Maharashtra sow lesser number of millets, but a larger variety of beans. They also grow pumpkins and other vines within the *penda* plot. This mixed crop not only gives them a varied and nutritious diet but also protects local agro-biodiversity. *Bewar* grain has added advantages, inform farmers. For one, they are more filling. "Six to seven quintals of *bewar* millets last my family for the whole year," says Lamtibai Rathuria of village Chapwar. "But a similar quantity of *dhaan* (paddy) gets eaten up in four to five months." Secondly, grains like *kodo* and *kutki* can be stored for many years without spoiling. *Kodo*, say farmers, stays good for more than 50 years, while *kutki* can last up to 30. "We can store our surpluses in good years for as long as we want, and they form a safety net for the lean ones," says Lamtibai.

[Published Earlier in Down To Earth, Jan 10, 2014

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