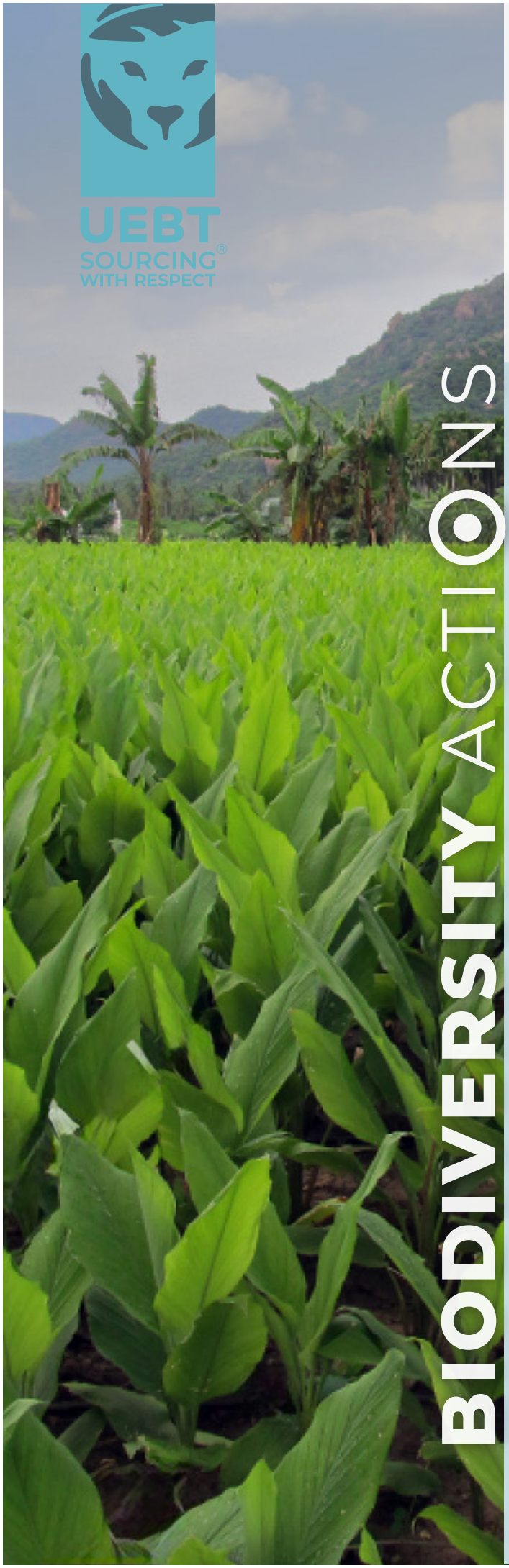


TURMERIC IN SOUTHEAST INDIA

A Case Study

A Biodiversity Action Plan (BAP) provides guidance in designing and implementing concrete practices on sustainable use and conservation of biodiversity when growing and sourcing natural raw materials..

TURMERIC *Curcuma longa*

The Facts

- Part of the ginger family (*Zingiberaceae*), the perennial turmeric plant is native to Southeast Asia where it is cultivated especially in India and in the islands of the Indian Ocean.
- From the creeping roots, leaves emerge in a plant that reaches one meter in height and produces yellow-orange flowers.
- The turmeric spice comes from the tuberous roots.
- In addition to being appreciated for its culinary purposes, turmeric has medicinal and dietary anti-inflammatory properties and in ancient times was used in textile dyes and perfumes.
- Turmeric cultivation in Southeast India has taken place for more than a century.
- In some hilly forests, Turmeric farming is more recent. In those areas, cultivation is happening (and is allowed) in buffer zones, but this can be detrimental to wildlife.
- Farms range in size from small to large. Monocropping is typical with some other crops in between Turmeric harvests and sowing/rotation.
- Only 5% of Turmeric varieties used are native species. The rest is introduced – with some varieties considered invasive. Some experiments are showing that traditional varieties are resistant to erratic rains. Introduced varieties are sensitive and require the use of synthetic agrochemicals. But the traditional varieties have lower yields, so farmers prefer the introduced varieties.
- Seeds are produced by farmers and farmers regularly use synthetic agrochemicals even for seed preparation. Still there is high loss of Turmeric spice-producing roots (40% of the rootstalks are lost due to rain at time of their formation).
- Synthetic agrochemicals have high toxicity are used on a regular basis, based on the calendar, and for soil fertilisation and weed control. Application is not systematically tracked nor based on results of soil tests or pest/weed observations.
- Some farmers choose more natural and, in some cases, organic farming. They are experimenting with crossing traditional varieties, adjusting crop cycles to avoid sowing when the temperature is too high, using practices such as permanent cover to ensure fertility, weed control, and soil humidity balance. They also apply farmyard manure, worms for composting, and in some cases organic fertilisers instead of synthetic ones.
- Irrigation is done on an as-needed basis but sometimes this can be excessive. Different sources of water are used – from wells, to canal irrigation, to rainwater – and in many cases the water is polluted. Only organic or natural farmers do an analysis to check the suitability of water.
- Wood from firewood or from Turmeric waste is used for the drying process. Diesel motors are used for polishing, and produce dust that is creating respiratory problems within local communities.
- There is no collection system for hazardous waste such as agrochemical containers – therefore those are disposed improperly. Organic waste is used for compost by producers practicing organic or natural farming.

TURMERIC IN TAMIL NADU

Tamil Nadu, in Southeast India, has a special location near fertile coastal plains, hills rich in vegetation and arid plains. The Western Ghats are one of the mountain ranges traversing Tamil Nadu and hosting a rich biodiversity of mammals, birds, reptiles, fish, and plants. The area has many rivers supplied by the mountain ranges and is rich in tropical evergreen and deciduous forests and grasslands. One of the nature reserves, Sathyamangalam Tiger, is a wildlife corridor and gateway to the Western Ghats, providing a link between several wildlife sanctuaries, nature reserves and protected areas.

These habitats host, among others, Bengala tigers, Asian elephants, Indian vultures, Indian guars, Indian deer, four-horned antelopes, sloth bears, Bonnet macaques, Common langurs, Black-naped hares and migratory birds such as cormorants, herons, and Indian moorhen.

Degradation of habitats for wildlife

Threats to biodiversity and wildlife, caused by human activities, include land conversion, poaching, electric fencing, illegal logging, forest fires and pollution from the use of synthetic agrochemicals in farming and contamination from other industries.

Habitat degradation and fragmentation are the main consequences of these threats. Water and soil are polluted, making it difficult for animals to find drinking water and for important organisms in the soil to survive. Corridors that are used for big mammals when looking for food and shelter are interrupted by the presence of human activities. This reduces the space available for animals and increases human-wildlife conflicts.

Invasive species take advantage of this degrading situation. As native and beneficial species are less able to survive, invasives species find their way into forests and natural areas and outcompete the native species. This often leads to the use of high toxicity pesticides in natural areas.

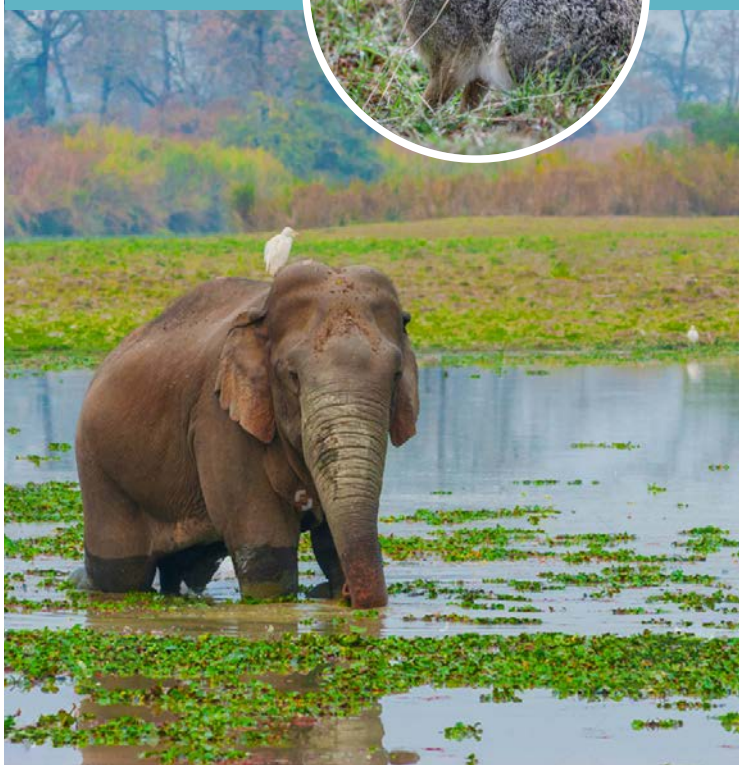
There are some environmental regulations that prohibit the killing of wild animals; however, they are weakly enforced and little known among local communities. Some environmental regulations are getting weaker as well – e.g., a 10 km distance from the natural forest was required some years ago for farming, but now this has been reduced to only 1 km. Ineffective regulation and lack of awareness on biodiversity aggravate the already vulnerable conditions for wild species in the degraded habitats where they live.

The vicinity of farm sites to protected areas increases pressure on native habitats and leads to human-wildlife conflicts. Buffer zones adjacent to protected areas can play a good role in managing this issue by shielding against farming.

Buffer zones contribute to re-establishing natural ecosystem dynamics by reducing cross contamination and habitat fragmentation, increasing surface of protected areas, conserving native flora, and preserving species with a high ability for motion and orientation (so that populations of the same native species across larger spaces can develop).

The buffer zone supports wildlife activities, allowing plants and animals to migrate and spread, increasing the biodiversity in the area. Buffer zones also contribute to ecosystem functions such as balancing the micro-climate, restoring soil conditions, and supporting the water cycle.

CONSERVATION



GOAL 1 CONTRIBUTE TO THE CONSERVATION OF NATURAL HABITATS

Possible actions

- **Promote or join initiatives to tackle human-wildlife conflict.** Stop practices – such as electric fencing – that are harmful for wildlife. Participate in local initiatives to understand local human-wildlife conflict dynamics, identify and support systemic solutions such as natural fencing, GPS based alert systems, conservation, and expansion of natural habitats for wildlife.
- **Promote or join initiatives to tackle soil and water pollution.** Engage with government, organisations, and other industry representatives to discuss issues and solutions including practices to reduce pollution as well as technology and natural solutions to purify contaminated water.
- **Train farmers on the impact of farming on local biodiversity.** Train farmers on the negative impact that may derive from the application of synthetic agrochemicals, the unconscious use of water and firewood, and the conversion of natural habitats.

  Raise awareness among farmers of the possible positive impact of natural and organic farming, and the management of farmed and non-farmed areas on the farm with practices that promote ecosystem services.
- **Expand buffer zone areas on and off farms.** Dedicate a part of the total farm area – especially in those farms in the hilly areas which are closer to natural forests – to the buffer zones.

  Promote purposeful management through setting up natural structures and introducing native vegetation with specific ecosystem functions such as providing habitat for pollinators, butterflies and local flora and fauna (all of which combat invasive species, pest, and diseases); reducing cross-contamination and run-off; and balancing humidity, improving soil conditions, and contributing to water purification.

About the DPP Spices Project, GIZ India

This project is part of the develoPPP.de Programme implemented by GIZ on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ). The lead partner agencies for this project are AVT McCormick and McCormick Switzerland. develoPPP was set up by BMZ to involve the private sector in areas where business opportunities and development policy initiatives overlap.

The objective of program is Enhancement of Smallholder Spice Farmer's Capacities in Sustainable Farming' aims to strengthen the production of Cardamom, Cumin, Turmeric, Dill Seed and Celery in six states of India – Kerala, Tamil Nadu, Karnataka, Rajasthan, Punjab and Haryana – to increase the capacities of spice farmers to make production practices more economically, socially, and environmentally sustainable.

GOAL 2 REDUCE THE APPLICATION OF HIGHLY TOXIC AGROCHEMICALS AND THEIR NEGATIVE IMPACT

Possible actions

- **Use resilient Turmeric plant varieties, naturally adapted to local conditions.** Select varieties to test, with a special focus on traditional varieties. Set up experiments and a monitoring system to observe aspects such as quality, yield, resistance to pests and diseases, and similar elements in relation to climatic events and natural farming practices. Introduce into production those varieties that showed the best results in the experiments, while continuing to observe the remaining varieties.
- **Implement alternatives to synthetic and high toxicity pesticides and herbicides.** Study and identify the best organic alternatives to the synthetic substances used. Study the root cause of pest, disease, and weed spreading and tackle them through integrated pest management (IPM). IPM practices will include systemic monitoring of pests, diseases, and weeds. Moreover, IPM will include preventive actions such as the selection of suitable varieties and selection of disease- and weed-free roots. Other preventive actions require adjusting the crop cycle to avoid sowing in the hottest season (e.g., six months cycle), and ensuring the right levels of humidity in the sowing fields through monitoring soil humidity before irrigation, setting up vegetative filter strips with fodder gras, vegetation cover, mulching techniques, cover crops, ditches, check dams or brushwood dams, percolation ponds, loose boulder structures, drop spillways, and similar. Finally, IPM will include control measures such as removal of plants affected by diseases, control of weeds and invasive species manually and through competing vegetation, trap plants and plants that attract control species. This can be set up in farmed areas and in buffer zones. Train farmers and incentivise them to use organic substances and follow IPM.
- **Implement natural soil management to ensure good soil conditions.** Do regular soil tests and let the results inform nutrient enhancing practices. Study suitable organic alternative to synthetic fertilisers and make replacements. Among possible alternatives there is compost from biowaste, manure, worm compost, green manure between crop cycles, legume cover crops and mulch. Promote natural practices to avoid soil degradation from monocropping such as crop rotation and intercropping. Train farmers on those alternatives and incentivise their application.
- **Tackle invasive species with natural controls.** Participate in initiatives and engage with university staff and experts to research biological and natural control of invasive species. Plant native vegetation in farm borders and farmed fields and apply mulch to compete with weeds and invasive species. Promote manual control until better alternatives are identified. Identify the best timing for manual weed control. Train farmers in those practices and incentivise their adoption.

The overuse of agrochemicals contributes to a decline in pollinators and other wildlife species, spread of invasive species and soil and water degradation. Regenerative farming practices start from understanding the root causes of pests, diseases, weed spread, and degrading soil conditions. Those causes are linked to altered ecosystem functioning. Regenerative farming practices promote the rehabilitation of the ecosystem using biodiversity and natural structures. Native plants – in farm borders or as cover in farming fields – can be used as traps for pests and to attract beneficial insects.

Plant cover also contributes to limiting the spread of unwanted weeds and invasives species. Buffer areas with high vegetation contribute to balance the microclimate and calm the effects of changing climatic conditions (e.g., strong wind and heavy rain that may cause erosion, reduced or erratic rain that may cause drought or too much humidity when not needed), as well as to restore natural resources to good condition (e.g., purifying water). All this allows for managing farming systems with low-inputs and restoring biological diversity and good condition of natural resources.

REGENERATION

GOAL 3 IMPROVE WATER USE EFFICIENCY AND REDUCE CONTAMINATION

Possible actions

- **Monitor soil humidity.** Train farmers on implementing analyses of soil humidity, assessing watering needs based on leaf colour and monitoring weather forecasts before irrigation. Support farmers in establishing monitoring and recording systems for water applications.
- **Set up drip irrigation systems.** Support a gradual process of farmers in adopting drip irrigation.
- **Select natural water structures to retain rainwater, balance humidity, and purify water from any contamination.** Dedicate some natural structures to rainwater capture systems, that can channel water where needed for irrigation to reduce reliance on groundwater sources. Support farmers in identifying the most suitable structures based on farm condition and visit nearby farms to study similar structures and their functions. Consider ditches, canals, ponds and planting native vegetation with water purifying properties.

GOAL 4 SUPPORT LOW EMISSION ENERGY SOURCES AND APPROPRIATE WASTE MANAGEMENT

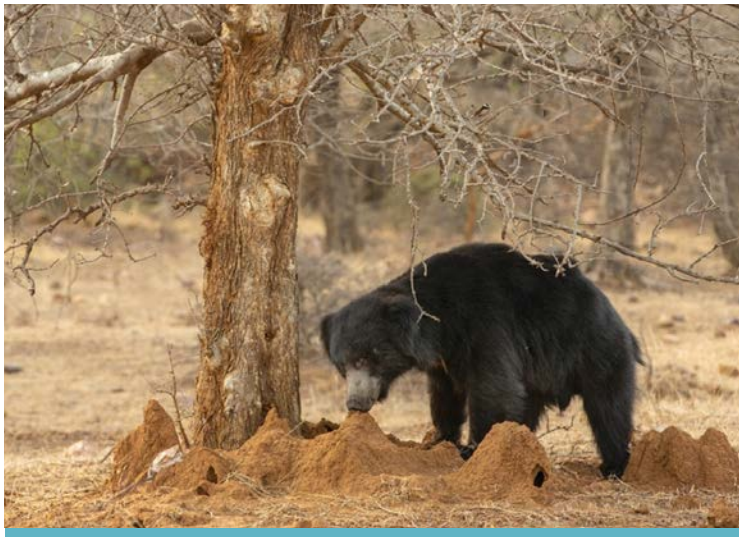
Possible actions

- **Increase use of solar energy sources, rather than firewood, for Turmeric drying.** Replace the use of firewood for Turmeric drying with solar dryers, ensuring access of these facilities to farmers. Implement a pilot study on solar dryers and explore slicing of the Turmeric-producing rootstalks after steaming and boiling to facilitate a quicker drying process.
- **Tackle dust pollution from Turmeric polishing.** Diesel engines are used to facilitate the tedious and time-consuming polishing phase of the dried Turmeric, which serves to remove the outer skin, roots and soil particles and transform it into a smooth product. Collaborate with the community and experts to find solutions to this issue, set up a working group with local stakeholders and identify possible solutions.
- **Implement a safe system for waste disposal of inorganic waste.** Provide access to farmers to a safe disposal system for agrochemical containers. Consider the options to support farmers to buy agrochemicals from companies that collect the empty containers or establish a disposal point that is safe and well insulated and linked to a collection and disposal system by trusted companies.
- **Train farmers on composting practices.** Provide training to farmers on composting organic farm waste, worm composting and the use of a natural waste decomposer.

Soil, water, and air are essential for the environmental health of the area. They are under pressure from various types of contamination activities and improper management. Inaccessibility to certain facilities such as waste collection systems or lack of sustainable use systems for resources, such as water catchment structures, exacerbate the vulnerable conditions.

Practices including the use of more efficient irrigation and energy systems are needed, as well as the development of proper waste management systems, and the reduction of agrochemicals. These measures contribute to reducing pressure on natural resources and to using them sustainably.

SUSTAINABLE USE



FROM COMMITMENT TO ACTION

The company that promoted the BAP has a long-term commitment related to socio-economic sustainability.

The opportunity to engage in a public-private partnership made resources and expertise available to plan the transition from synthetic input-based farming to regenerative farming.

EXPECTED IMPACT

A 2017 comprehensive literature synthesis[1] that reviewed multiple scientific studies on biodiversity conservation techniques shows that:

- Retaining areas of natural or semi-natural vegetation around core habitats protects the habitat and wildlife that it supports from the detrimental effects of habitat loss or disturbance.
- Managing hedges for wildlife increases native fruit species yields, diversity and abundance of plants, invertebrates, and birds.
- Reducing fertilizer, pesticide or herbicide inputs prove to benefit invertebrates, plants, and birds and where areas are treated with organic rather than mineral fertilizers these show more plants or invertebrates or higher diversity.
- Removing invasive grass or weed species increases understory plant biomass or tree seedling height.
- Growing cover crops improves soil structure and nutrient retention.
- Including legumes in crop rotations increases the number of microbes and diversity of different soil animals.

Other expected impacts

- Increased adaptability of turmeric to changing climatic conditions due to increased diversity.
- Improved soil health with less input, regenerative strategies, and proper analyses.
- Water level and quality is maintained through adoption of more resource efficient practices.
- Reduced cross contamination and pollution from agrochemicals.
- Stabilized yields after addressing causes of turmeric rhizome mortality, providing proper soil humidity, soil fertility and natural pest control.
- Reduced costs for inputs thanks to the use of alternative methods for soil and pest management.

How to begin?

Acting for biodiversity means acting in a systemic and context specific way. You can:

- **Assess opportunities** and threats to biodiversity in the context of your sourcing.
- **Implement actions** that focus on conservation, restoration, and sustainable use.
- **Plan different measures** and coordinate with different actors along the supply chain.

Roles and responsibilities

- An international organisation and local companies invested in a public-private partnership that provided the financial resources needed to start up the process of defining a Biodiversity Action Plan (BAP).
- Farmers contributed by sharing their experiences and knowledge.
- A team consisting of a local agronomist, with the support of an ecologist and a UEBT biodiversity expert, gathered all the relevant knowledge and defined the BAP.

Learnings to share

- A partnership between an international organisation and a local processing company facilitated the start of the activities and provided the financial resources needed.
- The presence of an experienced team of agronomists and their long-term collaboration with farmers represented a significant source of information to understand the key issues to tackle at the farming level.
- The expertise of an ecologist complemented the existing knowledge with a broader understanding of local biodiversity and how this can be instrumental to tackle issues at the farm level. This expertise was crucial to understand the impact of farming on local biodiversity and how to counteract it.
- The BAP approach helped to organise all knowledge into a set of clear targets and activities to implement.
- Considering the starting point of the farmers, a two-step approach was needed to facilitate first, the transition from synthetic agrochemicals to organic alternatives, and second, the transition to regenerative practices.

Specific actions and a work plan are defined for each farm. Monitoring begins one year after implementation.

The UEBT Standard

Through its requirements in Principles 1 and 2 (Conservation of Biodiversity / Sustainable Use of Biodiversity) – guides its members and their suppliers to define and implement systemic approaches to biodiversity conservation and sustainable use.

To facilitate this process, UEBT recommends companies adopt Biodiversity Action Plans as a strategic road map for businesses to contribute to reversing the loss of biodiversity on Earth.

About UEBT and this work

This case study is one of many examples of plans and types of actions that can be taken to reduce negative impacts on biodiversity or promote positive impacts. UEBT has drawn this material from its work with various companies and provides these cases to inspire companies to take concrete actions in their own supply chains.

UEBT wishes to thank AVT McCormick, whose work inspired this case. This case study was done with the support of GIZ.

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