

Integrated Approaches for Bioresource Circularity Towards Agroecological Transformation in India

Learnings from GIZ India Initiatives in Maharashtra and Madhya Pradesh

Image: markus spiske /unsplash



Implemented by



As a federally owned enterprise, GIZ supports the German Government in achieving its objectives in the field of international cooperation for sustainable development.

Published by

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices

Bonn and Eschborn, Germany

Soil Protection and Rehabilitation of Degraded Soil for Food Security (ProSoil)
A2/18 Safdarjung Enclave
New Delhi 110 029 India
T: +91 49 49 5353
F: +91 49 49 5391
E: info@giz.de
I: www.giz.de/india

Responsible

Mr. Rajeev Ahal
Director, Natural Resource Management and Agroecology, GIZ India
E: rajeev.ahal@giz.de

Design and Layout

Aspire Design, New Delhi

Photo credits

Cover: [jcomp/freepik](https://www.freepik.com)

GIZ is responsible for the content of this publication

On behalf of the
German Federal Ministry for Economic Cooperation and Development (BMZ)

New Delhi, August 2023

Table of Contents

| | |
|---|----|
| List of Abbreviations | 2 |
| Introduction | 4 |
| Background | 4 |
| A Holistic View of Bioresources: The E-Prakriti Way | 5 |
| Successful GIZ Pilots on Bioresources and Learnings from the Ground | 6 |
| I. From Cow Dung to Energy and Bio-PROM: An Enterprise Model | 7 |
| II. Urban Rural Nutrient and Carbon Cycle (URNCC): Circularity of Urban Organic Waste | 9 |
| Adjunct Activities | 10 |
| I. Engaging State Agriculture Universities (SAUs) for Quality Control | 11 |
| II. Recycling Biochar to Boost Soil Organic Carbon | 11 |
| III. Digital Technologies to Assess Soil Organic Carbon and Regenerative Agriculture | 12 |
| IV. Network to Promote Knowledge and Models on Bioresources Management | 12 |
| Recommendations: Replicating and Mainstreaming Circularity of Bioresources to Reduce Inorganic Fertiliser Use | 12 |
| I. Leveraging the Swachh Bharat Mission | 12 |
| II. Fiscal Support to ULBs and FPOs | 13 |
| III. Research and Extension Initiatives | 13 |
| IV. Product Quality and Standards Assurance | 13 |
| V. Institutionalising Capacity Development | 13 |
| VI. Incentivising Organic Manure for Farmers | 14 |
| VII. Replicating Digital Solutions like the HARIT Ticker | 14 |
| VIII. Replication and Scaling of Viable Business Models | 14 |
| Annexures | 15 |
| Annexure 1 | 15 |
| Annexure 2 | 36 |
| Annexure 3 | 38 |
| Annexure 4 | 40 |
| Annexure 5 | 44 |

List of Abbreviations

| | |
|-------------------|--|
| ATMA | Agriculture Technology Management Agency |
| BMZ | German Federal Ministry for Economic Cooperation and Development (Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung) |
| BIRD | The Bankers Institution for Rural Development |
| DAP | Diammonium Phosphate |
| DFI | Doubling Farmers' Income |
| FCO | Fertiliser Control Order |
| FPCL | Farmer Producer Company Limited |
| FPO | Farmer Producer Organisation |
| GIZ | Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH |
| GOBAR-Dhan | Galvanising Organic Bio-Agro Resources |
| I4Ag | Innovations for Agriculture |
| IBBN | Indian Bioresources and Biochar Network |
| ICAR | Indian Council of Agricultural Research |
| ICRAF | International Council for Research in Agroforestry |
| IFFCO | Indian Farmers Fertiliser Cooperative |
| KRIBHCO | Krishak Bharati Cooperative |
| MANAGE | National Institute of Agricultural Extension Management |
| MAP | Monoammonium Phosphate |
| MoAFW | Ministry of Agriculture and Farmers' Welfare, Government of India |
| MoHUA | Ministry of Housing and Urban Affairs, Government of India |
| MPKV | Mahatma Phule Krishi Vidhyapeeth |
| NABARD | National Bank for Agriculture and Rural Development |
| NGO | Non-Governmental Organisation |
| NPK | Nitrogen, Phosphorus, Potassium |

| | |
|------------------|--|
| NRAA | National Rainfed Area Authority |
| PMKY | Paramparagat Krishi Vikas Yojana |
| PM PRANAM | Promotion of Alternate Nutrients for Agriculture Management |
| PROM | Phosphate-Rich Organic Manure |
| ProSoil | Soil protection and rehabilitation of degraded soil for food security in India |
| RRA-N | Revitalising Rainfed Agriculture Network |
| SAMETI | State Agriculture Management & Extension Training Institutes |
| SSP | Single Super Phosphate |
| UDD | Urban Development Department |
| ULB | Urban Local Body |
| URNCC | Urban Rural Nutrient and Carbon Cycle |



Image: Wlrestock/freepik

Introduction

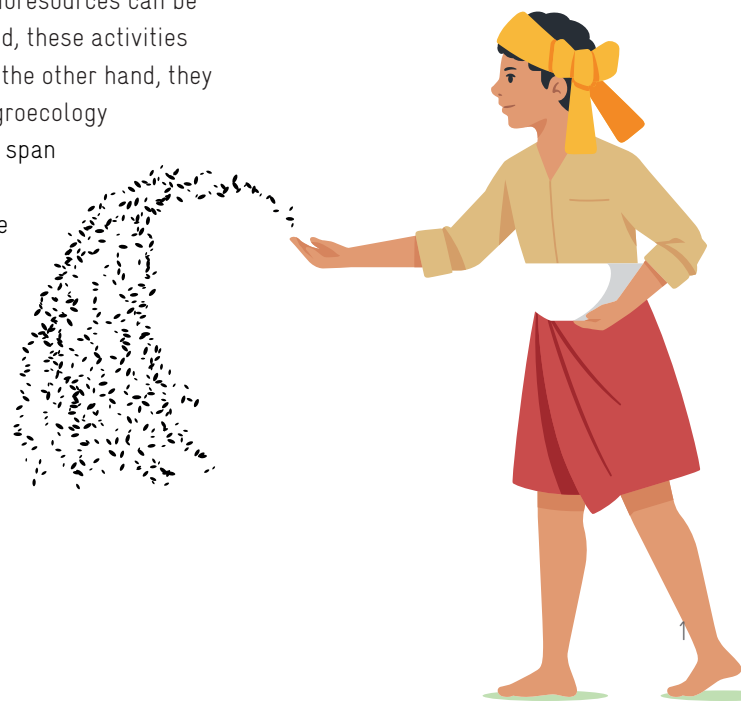
Indo-German development cooperation project 'Soil Protection and Rehabilitation of degraded soil for food security in India (ProSoil)' is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ) in partnership with the National Bank for Agriculture and Rural Development (NABARD) in the Indian states of Maharashtra and Madhya Pradesh. The project is part of a larger global programme under BMZ's Special Initiative "Transformation of Agricultural and Food Systems".

ProSoil works with implementation partners and nodal departments including the National Institute of Agricultural Extension Management (MANAGE), Indian Council of Agricultural Research (ICAR)-Indian Institute of Soil Science (ICAR-IISS), NITI Aayog, the Ministry of Rural Development, the Ministry of Agriculture and Farmers' Welfare, Environment and Climate Change Department, Government of Maharashtra, Madhya Pradesh State Rural Livelihood Mission, National Rural Livelihood Mission, Urban Development Department of the Government of Maharashtra, Mahila Arthik Vikas Mahamandal (MAVIM) - State Women's Development Corporation of Government of Maharashtra, state agriculture universities from Maharashtra and Madhya Pradesh, along with local NGOs, and national and international research institutions.

Since 2015, ProSoil has been carrying out field activities to establish viable models and demonstrate how already widely available bioresources can be circulated to improve soil fertility and health. On one hand, these activities ensure nutrients and carbon are recycled in the soils. On the other hand, they also offer economically viable options for farmers and agroecology practitioners to practice natural farming. These activities span across various kinds of bioresources and involve several stakeholder ranging from government to state agriculture universities and farmers.

Taken together, these activities and the stakeholders involved in them, present an integrated approach of employing bioresources in a way that can support agroecological transformation in India.

Deutsche Gesellschaft für Internationale Zusammenarbeit's (GIZ) implementation partners in this project include the Urban Development Department (UDD) of Maharashtra, state agriculture universities, the National Institute of Agricultural Extension Management (MANAGE), the Ministry of Agriculture and Farmers' Welfare (MoAFW), Government of India and NGOs.



Background

The agriculture sector in India faces the challenge of ongoing degradation of its limited soil resources. As per government estimates, 16.4 tonnes of soil per hectare per year is lost to degradation. As per estimates by the Indian Council of Agricultural Research (ICAR), almost 120.4 million ha of land is affected by degradation of varying intensity. Degradation of soil manifests as the deterioration of soil health and quality and hence its productive capacities.

Since the Green Revolution in India starting in the late 1960s and continuing to the 1970s, there has been a decline in fertiliser response in irrigated areas. It has gone down from 13.4 kg grain per kg of Nitrogen, Phosphorus, Potassium (NPK) to 3.7 kg grain per kg of NPK in 2005.¹

Over the years, while intensive agriculture increased food production, it also caused secondary problems of nutrient imbalance.² Indian soils not only show deficiency of NPK, but also of secondary nutrients like Sulphur, Calcium and Magnesium, and micronutrients like Boron, Zinc, Copper, and Iron. This has become a limiting factor in increasing food productivity.

Further, the Soil Organic Carbon (SOC) content in India has come down to 0.3 per cent from 1 per cent in the past 70 years which is a cause of concern for the agriculture sector.³

- 1 Kannan, P and Arunachalam, P and Govindaraj, M (2015) Implications and Ways to Enhance Nutrient Use Efficiency Under Changing Climate. In: Crop Improvement in the Era of Climate Change. I K International Publishing House Pvt. Ltd, India, pp. 115-142. ISBN 978-9382332619, <http://oar.icrisat.org/8938/>.
- 2 "Compendium on Soil Health Ministry of Agriculture, Department of Agriculture & Cooperation (INM Division)." 2012. <https://agricoop.nic.in/sites/default/files/Comsoilhealth28612.pdf>.
- 3 Business Standard. "Soil Organic Carbon Content Fell from 1% to 0.3% in 70 Years in India: NRAA." www.business-standard.com, 26 Mar. 2022, www.business-standard.com/article/current-affairs/soil-organic-carbon-content-fell-from-1-to-0-3-in-70-years-in-india-nraa-122032600305_1.html.



In 2022, India spent between INR 2 and 2.5 lakh crore on fertiliser subsidies. NITI Aayog, the Ministry of Chemicals & Fertilisers, Government of India, and the Ministry of Agriculture and Farmers' Welfare (MoAFW), Government of India, Government of India are jointly working with concerned stakeholders to reduce the use of inorganic fertilisers in the agriculture sector in India. The aim is to not only reduce dependence on inorganic fertilisers, but also to promote soil health and accrue climate change mitigation co-benefits.

Currently, India's chemical fertiliser consumption is ~650 LMT. The country is also boosting domestic production capacities of fertilisers to reduce cost and make India "atmanirbhar" or self-reliant. However, alternatives are critical not only to reduce the expenditure and dependence on inorganic fertilisers but also to shift towards sustainable agriculture.

There is a potential to optimally manage, recycle, and reuse available bioresources to the same end. Such circularity of bioresources is also supported by schemes initiated by the central government like GOBAR-Dhan, Promotion of Alternate Nutrients for Agriculture Management (PM PRANAM), the National Mission on Natural Farming, Paramparagat Krishi Vikas Yojana (PKVY), among others.

Some bioresources that can be circulated to improve soil health are:



Cow dung

India's livestock population of an estimated 512 million together produces about 1,095 million MT of cow dung every day.

(Source: Parihar, SS et al., Livestock waste management – A review; Journal of Entomology and Zoology Studies, 2019)



Urban organic waste

Urban areas produce an estimated 50 million MT of waste per year, which is estimated to reach around 125 million MT by 2031. Of this, almost 52% is biodegradable.

(Source: NITI Aayog, 2021)



Crop residue

India produces over 500 million MT of agricultural residue every year, out of which 141 million MT is surplus. Of this, 92 million MT is burnt, leading to serious air pollution.

(Source: Bimbrow, A.S, Generation and Impact of Crop Residue and its management, Current Agriculture Research Journal, 2019)



A Holistic View of Bioresources: The E-Prakriti Way

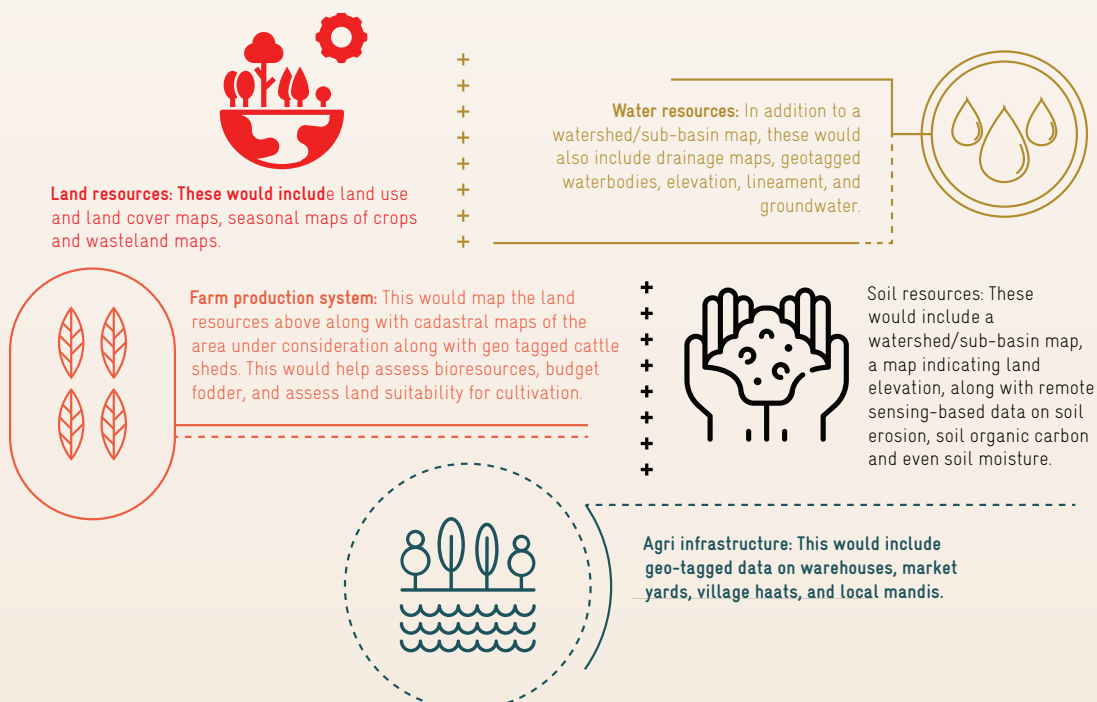
To effectively plan and execute a bioresource intervention, an overarching view of available resources is essential. This is possible through “E-Prakriti”, a geospatial tool, developed by GIZ India under the ProSoil project. It uses open-source GIS tools to assess available or surplus bioresources for any landscape through reliable spatial maps and digital analysis of spatial and non-spatial data. It does all this in real-time.

For example, mapping the soil-water-land nexus through this tool helps assess the requirement of bio-inoculants like Jeevamrut.



Photo 1: A screenshot of geotagged data on cattlesheds and other resources. This can be used to plan Centralised Jeevamrut units in any region

Similarly, the tool also helps in mapping various kinds of resources in an ecosystem, for example:



The use case established for this tool starts with mapping available resources through remote sensing. This data is then analysed, interpreted and validated with ground truthing exercises. This can then be followed by a stakeholder consultation, where the validated data is used to draw up an extensive activity plan.

As a planning tool, e-Prakriti serves the objective of offering bioresource enterprises a bottom-up approach for an informed, scientific design of interventions. This digital capacity is essential for the shift towards natural farming models.

Successful GIZ Pilots on Bioresources and Learnings from the Ground

Under the ProSoil project, GIZ India together with partners carried out circularity-based pilots in the Indian states of Maharashtra and Madhya Pradesh. Taking a holistic view of bioresources, these pilots involved various kinds of bioresources that had the advantage of being widely available on the field. The pilot projects involved processing these bioresources in ways that could be readily picked up by beneficiaries.

With integration at the centre of the project's efforts, the interventions involved not just farmers, but also Farmer Producer Organisations (FPOs) and urban local bodies within the proximity of project locations. The interventions went beyond one-time activities to establish sustainable business models that beneficiaries can continue to run independently.

A selection of successful experiences, viable business models, as well as supporting activities are summarised below:

1. From Cow Dung to Energy and Bio-PROM: An Enterprise Model

Intervention

GIZ India, along with its partners are currently implementing a model demonstrating enterprise-based circularity of cow dung. Here, livestock waste will be recycled for dual use for generating energy and to produce Bio-Phosphate Rich Organic Manure (Bio-PROM).

Cow dung is used at household levels to generate energy through biogas plants. The slurry from these biogas plants is filtered through a two-layered slurry filter as biocakes. The leftover liquid is directly applied in the farms. The dry biocakes are processed by adding rock phosphate and bio inoculants at an enterprise to produce Bio-PROM.

Bio-PROM has gained significant prominence in recent times as a substitute for Single Super Phosphate (SSP) and a close substitute for Diammonium Phosphate (DAP).





© GIZ/Hemant Chawla

Photo 2: Mr. Ramakrishan Sadashiv Pednekar and his wife Ms. Shital Ramakrishan Pednekar set up biogas slurry filters in the Vajarath village, Sindhudurg, Maharashtra.

This model is being piloted in the Sindhudurg district of Maharashtra at a cluster level. Suvarnakranthi Farmer Producer Company Limited (FPCL) in Sindhudurg is the community enterprise implementing this model. Lupin Human Welfare & Research Foundation (LHWRF) and BAIF Development are GIZ India's implementation partners in this initiative.

Business model

The pilot started in April 2023 with a group of 50 farmers and the community enterprise partner Suvarnakranthi FPCL. With the current business model, the number of farmers is expected to reach 100 by the end of its first year.

Suvarnakranthi FPCL has begun collecting dry biocakes from individual household biogas plants at INR 7/kg. They already have a capital investment of INR 16.74 lakh. Using this investment, the FPC has already procured a mixture blender, a chipper/pulveriser, a Produced Liquid Organic Fertiliser (PLOF) mixing chamber and other equipment. The resultant PROM is projected to be sold at INR 14/kg.

Revenue projection for the first year stands at INR 2.2 million. By year two and three, the number of farmers is expected to go up to 200 and then 300 respectively. Correspondingly, the revenue is projected to grow to INR 4.7 million and INR 7.8 million in those years. From the third year onwards, the profit margin for the FPO is projected to be 20%. With the number of farmers expected to plateau in the following year, year four revenue projection stands at INR 8.6 million.

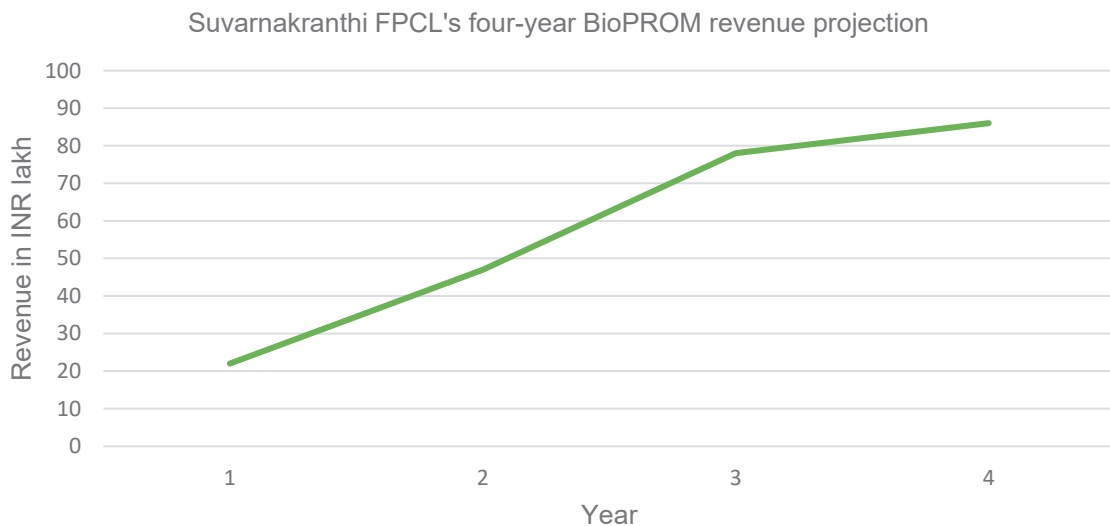


Figure 1: Revenue growth projection through PROM for Suvarnakranthi FPCL for 2023-27

Benefits to farmers

Processing cow dung into Bio-PROM turned out to be a viable business model for the Farmer Producer Company (FPC) in the pilot. Additionally, farmer households earned up to INR 4,000 from the sale of dry biocakes. Soil health also improved using Bio-PROM.

Recommendations

- ➔ Set up quality assurance protocols for PROM and systems to scale use by farmers. Research institutions like State Agricultural Universities (SAUs) can be engaged for this.
- ➔ Financial support from institutions like NABARD to establish PROM enterprise models (i.e., INR -17 lakhs as capital investment and INR -20 lakhs as working capital per enterprise).
- ➔ Leverage currently active subsidies for biogas units to establish them at individual and community levels.
- ➔ Advocate for integration of PROM with GOBAR-Dhan and other schemes to promote organic fertilisers.
- ➔ Advocate to include FPCs producing PROM under the Market Development Assistance (MDA) of INR 1,500/MT envisaged for organic fertilisers.



2. Urban Rural Nutrient and Carbon Cycle (URNCC): Circularity of Urban Organic Waste

Intervention

Under the ProSoil project, GIZ India introduced the URNCC initiative in Maharashtra in 2019, in close collaboration with the state government's Urban Development Department (UDD) and NABARD. The ongoing initiative involves circulating organic waste from urban areas in the rural agriculture sector.

Considering the current level of total waste generated in Maharashtra, the state has the potential to produce 350,000 MT of compost from organic waste streams every year.

Business model

The URNCC project started with capacity building of around 400 Urban Local Bodies (ULBs) in Maharashtra to produce quality compost from organic waste. GIZ India together with partners trained ULBs, and organised exposure visits for farmers and Farmer Producer Organisations (FPOs) to ULBs that produced quality city compost. Further, sampling protocols were introduced to ensure the quality of compost for agricultural use. Eventually, the project piloted FPO-based business models that would make this compost available to rural farmers for use in fields.

The pilot phase of the URNCC project raised awareness about the soil-enhancing properties of urban compost among farmers and FPOs through demonstrations. This led to an increased demand for quality city compost from farmers and FPOs. By 2021, nine FPOs in the state had taken up the city compost business. As a business model, they now directly buy compost from ULBs to supply it to farmers. As of 2022, 125 ULBs are either certified or are under process for re-certification as quality compost producers. This is up from 95 such ULBs in 2021.

Most importantly, during the project, the UDD Maharashtra developed and issued the "Policy for Promotion of City Compost" to further strengthen the URNCC (see Annexure 1).

Photo 3: Rajendra Nikalaje unloads segregated wet waste at a treatment facility in Nashik, Maharashtra.



Benefits to farmers

By the end of the pilot, farmers were able to meet 25% of the recommended Nitrogen for agricultural soil through urban compost. Crops treated with compost could withstand moisture stress during the dry spell, as the compost improved the soil's water holding capacity. Crops on plots treated with city compost were free of fungal and bacterial wilt, unlike the plots with farmyard manure. These plots also saw better crop growth for onion and sorghum during the 2019 Rabi season.

During 2022, one of the FPOs carried six procurement-and-sale cycles of 240 MT of city compost. This was procured at the cost of INR 4,000/MT and sold at INR 4,700/MT. The FPO was able to make a net profit of close to INR 1.4 lakhs in 2022.

Recommendations

- Promote compost among farmers through ULB-FPO linkages and capacity-building demonstration exercises.
- Identify and link farmer institutions like FPOs, FPO federations, farmers or local agri-entrepreneurs with ULBs and credit institutions.
- Develop technical guidelines, function and compliance systems, training programmes and incentive mechanisms for ULBs for quality assurance of compost.
- Collaborate with state missions to ensure quality of compost and functional linkages with farmer institutions.
- Collaborate with agriculture department to promote city compost through the Bharatiya Prakritik Krishi Paddhati (BPKP) programme and the National Mission on Natural Farming
- Incentivise and support FPOs to engage in city compost-based business models e.g., MDA, subsidies etc.
- National-level liaison between the Ministry of Housing and Urban Affairs (MoHUA), the Ministry of Chemicals and Fertilisers (MCF) and the Ministry of Agriculture and Farmers' Welfare (MoAFW), Government of India for quality assurance and promotion of city compost in the agriculture sector.



The FPO was able to make
a net profit of close to
INR 1.4 lakhs
in 2022



Adjunct Activities

The following ProSoil activities supported and enhanced the interventions on Bio-PROM and URNCC:

1. Engaging State Agriculture Universities (SAUs) for quality control

Specifications issued under the central government's Fertiliser Control Order (FCO) 1985 define the parameters for quality control of biofertilisers and organic fertilisers. However, accredited testing facilities and testing protocols are limited. The project explored the potential of engaging the existing capacities within the State Agriculture Universities to close this gap (see Annexure 2).

One SAU, namely Mahatma Phule Krishi Vidhyapeeth (MPKV), has well-established soil testing facilities, and has been a long-standing partner of the ProSoil project in Maharashtra.



Photo 4: A compost testing facility at MPKV Rahuri in the Ahmednagar district of Maharashtra.

Besides engaging MPKV as soil testing facility of city compost; the project also worked with MPKV to run field trials of city compost. The resultant suggestions and recommendations from these trials are currently under review for wider use and dissemination.

GIZ India facilitated the inclusion of MPKV as a testing facility for city compost produced by the ULBs. UDD Maharashtra issued a Government Order recognising MPKV as an official testing facility for city compost and defining testing rates (see Annexure 3).

UDD Maharashtra proactively established the “HARIT Certificate” and logo for compost compliant with FCO norms. This is issued after the compost passes the MPKV’s quality check. Additionally, the UDD provides a subsidy of INR 1,500/MT to ULBs for certified compost. The UDD has mandated ULBs to produce compost only from segregated organic waste.

2. Recycling biochar to boost soil organic carbon

Reportedly, nearly 65% of Indian soils have low organic carbon because of poor soil health. Biochar, which is a residue of biomass pyrolysis, can store carbon in soils for long periods of time. Conservative estimates suggest that over half of biochar carbon can remain in soils after 100 years.⁴ While it is not a fertiliser by itself, it increases the capacity of soils to absorb nutrients from fertilisers. Across the tropics, its application to soil results in an average crop yield increase of 25%. Globally, it is known to increase crop yields by 15%.⁵

GIZ India together with partners, like the International Council for Research in Agroforestry (ICRAF) and NGOs in the region, have been experimenting and piloting viable models for converting biomass into biochar.

3. Digital technologies to assess soil organic carbon and regenerative agriculture

Through the global development cooperation project Innovations for Agriculture (I4Ag), that GIZ implements on behalf of the Federal Ministry for Economic Cooperation and Development (BMZ), have piloted an innovative remote sensing-based approach to assess soil organic carbon and monitor regenerative agriculture practices. Operational under I4Ag, this is called the Soilify project. It aims to provide cost effective methodology to assess soil carbon sequestration with potential use cases in the voluntary carbon markets as well as by public institutions like the MoAFW, NABARD and others to assess and report on carbon benefits generated by sustainable agriculture and soil management measures (see Annexure 4).

4. Network to promote knowledge and models on bioresources management

ProSoil supports the establishment of the Indian Bioresources and Biochar Network (IBBN), to promote research-based models for biochar and bioresources management, and to support adoption capacities. The IBBN will also leverage various networks like the **Revitalising Rainfed Agriculture Network (RRA-N)**, **National Coalition for Natural Farming (NCNF)** and others to promote the use of bioresources and biochar under the overall transformative processes towards natural farming.

4 Etter, Hannes, Andrea Vera, Chetan Aggarwal, and Matt Delaney. n.d. “METHODOLOGY for BIOCHAR UTILIZATION in SOIL and NON-SOIL APPLICATIONS Title Methodology for Biochar Utilization in Soil and Non-Soil Applications.” Accessed June 15, 2023. https://verra.org/wp-content/uploads/imported/methodologies/210803_VCS-Biochar-Methodology-v1.0-.pdf.

5 Ye, Lili & Camps Arbostain, Marta & Shen, Qinhua & Lehmann, Johannes & Singh, Balwant & Sabir, Muhammad. (2019). Biochar effects on crop yields with and without fertilizer: A meta-analysis of field studies using separate controls. *Soil Use and Management*. 36. 10.1111/sum.12546.

Recommendations: Replicating and Mainstreaming Circularity of Bioresources to Reduce Inorganic Fertiliser Use

In addition to the specific interventions enumerated above, there is a strong potential for scaling circulation of bioresources in other parts of the country. This would entail involving a wider set of actors and institutions within the ecosystems of sanitation, agriculture, municipal bodies and research organisations.

Urban local bodies (ULBs) are important stakeholders in this context. Urban India alone generates 51 million tonnes of municipal solid waste every year. This figure is expected to rise to 165 million tonnes per year by 2031 and about 436 million tonnes per annum by 2050.⁶ Apart from urban waste streams, at present, the country produces 686 MT of agricultural waste per annum, of which 234 MT (34%) is a surplus, that can also be recycled for soil enrichment.⁷

The following means may help realise the potential of this surplus waste in India:

1. Leveraging the Swachh Bharat Mission

The Swachh Bharat Missions (SBMs) 1 and 2, with financial outlay of over INR 2 lakh crores, aims to scientifically process 100% of the waste in urban areas – i.e., potentially ~131 million tonnes or ~65 million MT of organic waste, annually. With proper management and processing, this will further improve soils in about 8 million ha of rainfed land. The Ministry of Housing and Urban Affairs (MoHUA), Government of India, through SBMs is investing for setting up appropriate infrastructure facilities to process the waste in about 4,700 ULBs in India. These investments can be leveraged to set up nationwide URNCC with supply chain links to the farmers (e.g., through FPOs). The results of collaboration between the UDD and NABARD in Maharashtra has been fruitful, and further collaborations can be proposed at ministerial levels, between MoAFW, MoHUA and NABARD.

2. Fiscal support to ULBs and FPOs

Successful implementation of the URNCC approach needs sustainable incentives for actors in the city compost value chains, primarily the ULBs and FPCs. While the capital investment for processing facilities is leveraged through SBM 1 and 2, ULBs are needed to operationalise working capital. The ProSoil project has been implementing its interventions with nine FPOs and three ULBs in Maharashtra. These institutions have successfully implemented viable business models. With a network of about 4,700 ULBs and nearly 10,000 FPOs in India, and business potential of over INR 45,000 million annually, URNCC provides viable business opportunities to circulate urban organic waste to improve soil health and sequester carbon in the soils. Financial institutions like NABARD also provide much needed fiscal support for such business models.

6 Documentation of Best Practices on 3INR: Reduce, Reuse, Recycle. Ministry of Housing and Urban Affairs and GIZ India, May 2023.

7 Hiloidhari, Moonmoon, et al. "Bioenergy Potential from Crop Residue Biomass in India." *Renewable and Sustainable Energy Reviews*, vol. 32, Apr. 2014, pp. 504–512, <https://doi.org/10.1016/j.rser.2014.01.025>.



3. Research and extension initiatives

India has an extensive network of 64 research institutions under the Indian Council of Agriculture Research (ICAR), 63 SAUs and 725 KVKs providing expert research and extension support to the country's agriculture sector. Extension services under the Agriculture Technology Management Agencies (ATMAs) and digital platforms have been reaching out to millions of farmers in India.

This network of research and extension services needs to be further oriented and adapted to provide advisory and knowledge support to farmers regarding bioresources management. Validation and suggestions by research institutions on production and application of various products from bioresources would help establish legitimacy for the new techniques. Additionally, extension services would help scale adoption among farmers.

For example, under the ProSoil project, GIZ India collaborated with MPKV to run trials on city compost. Validated results from these trials are currently being converted into knowledge products for farmers to help them adopt and use city compost. In this regard, similar regional efforts can ensure its scaling up for agricultural use. Further, the extension services facilitate in creating awareness among farmers on use of city compost through demonstrations, Farmer Field Schools, FPO-based trials, etc.

4. Product quality and standards assurance

The use of city compost in agriculture has been endorsed by the Inter-Ministerial Committee through the Solid Waste Management guidelines.⁸ However, quality control of the same requires critical attention. Without proper segregation and processing of organic waste, city compost ends up with heavy metals and other contaminants.

Contaminated city compost is not only detrimental to soil health, but also affects human health through food chains. Hence, strict quality assurance systems need to be implemented including SOPs, certification and strict monitoring.

A 2014 revision to the FCO standardised quality norms for city compost. In Maharashtra, ProSoil has been supporting the UDD to develop SOPs and capacity development for processing of urban organic waste as well as refining the HARIT label. These initiatives have resulted in more ULBs producing quality compost. Similar, nation-wide certification schemes and protocols for city compost are needed from MoHUA to scale URNCC. MoAFW can identify, empanel and support in establishing a network of certified soil testing labs to ensure the quality of city compost compliant with FCO norms.

⁸ Guidelines for Preparation of Detailed Project Reports and Selection of Technologies for Processing and Final Disposal of Municipal Solid Waste Using 12th Finance Commission Grants. <https://mohua.gov.in/upload/uploadfiles/files/93.pdf>.

5. Institutionalising capacity development

The network of State Agriculture Management & Extension Training Institutes (SAMETIs) and KVKS are established institutions for capacity development in the agriculture sector. These institutions can further transfer capacities around the use of city compost by farmers. The Bankers Institution for Rural Development (BIRD) is a specialised institute providing trainings to FPOs and other financial institutions. Trainings around business models for FPOs and ULBs can be institutionalised at BIRD.

6. Incentivising organic manure for farmers

While there are incentives/subsidies on fertilisers, there is no or limited incentive for use of organic manures. MoHUA has introduced an MDA of INR 1,500 per tonne for city compost to create a viable product for the farmers. However, in the absence of a central MDA, farmers need to be incentivised for using organic fertilisers – specifically city compost. Various states, like Maharashtra, have launched state-level incentives for city compost. Such efforts are needed at national scale. The MoAFW may also design incentive mechanisms to encourage farmers to transition from conventional agriculture to natural farming.

7. Replicating digital solutions like the HARIT Ticker

The ProSoil project with UDD Maharashtra, has developed and piloted a blockchain-based digital marketing platform called 'HARIT Ticker' to link farmers and FPOs with ULBs.

A network of ULBs is already mandated to effectively process urban waste. This necessitates an effective monitoring system to understand the quality and quantity of urban compost being produced and sold by ULBs in the state. The 'HARIT Ticker' assists the ULBs in managing stock, storage, production and distribution of compost.

The HARIT Ticker is fully functional and has a crucial role in strengthening the city compost supply chain. Currently, 30 FPOs with a potential of around 10,300 farmers, and 396 ULBs (100% in the state) are registered on the HARIT Ticker (see Annexure 5).

The HARIT Ticker can be replicated and adapted to help the MoAFW monitor the use of city compost by FPOs and farmers, thereby monitoring the transition towards natural farming. Further, digital extension approaches can help build farmers' capacities for recycling bioresources.

8. Replication and scaling of viable business models

Various field experiences and business models implemented by ProSoil and partners around bioresources management have proven to be viable. Some of these are illustrated in the sections above. These business models are for farmer institutions like FPOs, as well as small enterprises. With the given network of FPOs in India and farmer groups, as promoted under the National Rural Livelihoods Mission by NABARD and other organisations, these viable business models have the potential to be adapted and scaled. Such incentive-based models would support scaling of natural farming and soil health measures as envisaged under initiatives like the MoAFW's National Mission on Natural Farming and NABARD's JIVA. Financing models and capacity support may hence be leveraged from existing national and state level programmes and schemes to support such FPO and enterprise-based business models around bioresources management.

Annexures

Annexure 1

F. No. 11026/14/2015-M&E
Government of India
Ministry of Chemicals & Fertilizers
Department of Fertilizers

Shastri Bhawan, New Delhi

Date: 09.01.2017

Office Memorandum

Subject: Guidelines for Direct Sale of City Compost by Compost manufacturers to farmers in bulk under the Policy on Promotion of the City Compost of the Department of Fertilizers (DOF).

In continuation of this Office O.M. of even no. dated 03.06.2016 and 10.10.2016, the guidelines on procedure for submission and processing of claims for payment of Market Development Assistance (MDA) of Rs. 1500/MT on sales of City Compost in the matter of implementation of Policy on Promotion of City Compost prescribed hereunder shall be applicable to sales made from the date of issue of this O.M.

A. Eligibility for Market Development Assistance

- i. The Market Development Assistance (MDA) for sale of City Compost as per the standards laid down in Fertilizer Control Order at subsidized prices will be paid only through concerned Municipality to the Compost manufacturer and to concerned Municipality where Municipality is the Compost manufacturer and Marketer.
- ii. All City Compost manufacturers as Marketers recognized by the concerned State Government shall be eligible to market its own City Compost and claim MDA. The letter of recognition should be signed by authorized Officer of the concerned State Department on its Official letter head. The recognition letter shall specifically mention that the Compost manufacturer as Marketer has long term tie up with concerned Municipality for manufacturing of City compost on sustained basis. The Proforma of the permission letter is at **(Annexure-I)**.
- iii. The Compost manufacturing companies interested to market City Compost is required to submit a letter through Municipality intimating their willingness to market City Compost along with details of manufacturers, and other information as per **Annexure-II** to Department of Fertilizers (DOF).
- iv. Each Compost manufacturer willing to claim MDA must have well equipped laboratory to ensure and test that City Compost produced by the manufacturer conforms to FCO standard.
- v. DOF will allot an IFMS ID to the company to enable it to upload the quantity of City Compost produced and sold to farmers, the MRP, etc. Uploading of

data relating to sales, MRP etc. is mandatory and the companies are required to generate monthly MDA claims online as is being done for P&K fertilizers and submit the claims to Director (FA), DOF, Udyog Bhawan, New Delhi for processing and arranging payment of MDA.

- vi. The Compost manufacturers have to upload on iFMS the any recognized photo identity of the farmers to whom the City Compost has been sold.
- vii. City Compost manufacturer shall upload the Government recognized photo ID card of the farmer, to whom the City Compost has been sold in bulk, on the portal of iFMS. The City Compost manufacturer shall also enter details of the Farmer such as name, father's name, address of the farmer, etc on the portal of iFMS.

B. Reasonableness of MRP

- i. Though the market price of City Compost will be determined based on demand-supply balance, the fertilizer companies will be required to mention Maximum Retail Price (MRP) along with applicable MDA on the cash memo clearly. Any sale above the MRP will be punishable under the EC Act.
- ii. Apart from MDA given by the Department of Fertilizers, if any State provides subsidy on City Compost, the MRP will be lowered by the Company to that extent and the subsidy so passed will also be passed on to the farmers in terms of lower MRP.
- iii. The Compost manufacturers as marketing entities are required to print the MRP and applicable MDA along with the subsidy paid by State Govt.(s) on the payment receipt. The marketing entities are also required to upload the same MRP in the iFMS besides furnishing the MRPs along with subsidy claims for each month.
- iv. Department of Fertilizers will establish appropriate mechanism to examine the reasonableness of MRP to ascertain whether the assistance given in the form of Market Development Assistance or State subsidy has been passed on to the consumers. In case, after the examination it is established that the assistance as described above has not been passed on, the same is liable for recovery.

C. General Payment Procedure for claiming Market Development Assistance (MDA) under Policy on Promotion of City Compost:

2. Process for release of 'On Account' Payment

- i. The Compost manufacturers as marketing entities of City Compost are allowed to claim 50% 'On Account' payment of subsidy through Municipality from DoF for the quantity of City Compost sold to the farmers, month-wise, based on the requisite information provided by them in prescribed

Proforma 'B1-CCD', duly certified by the authorized signatory of the Municipality as well as the statutory auditor of the Company.

- ii. A copy of the Proforma '**B1-CCD**' along with the supporting documents is also required to be submitted by the Compost manufacturers as marketing entities to the concerned State Government (Directorate of Agriculture) in which City Compost has been sold during a particular month, for quality verification and certification of the sale of City Compost executed by the marketing entity during a particular month. The details of the sales invoices and other supportive documents, etc. which are to accompany Proforma '**B1-CCD**' are to be sent only to the State/UT Governments within 30 days of the calendar month of sales.
- iii. The details of sales entered in IFMS are required along with Proforma **B1-CCD** as annexures.
- iv. The City Compost marketing entities are required to submit the specimen signatures of their authorized signatory as well as the Statutory Auditor along with their name and seal as well as for the manufacturers with whom they have their marketing tie up.
- v. The State Government in which the City Compost plant is located is required to inspect and certify that the quality of the City Compost produced by the unit during a particular month was as per the standards laid down in the FCO.
- vi. The State Government shall issue such certificate in its official stationery as per prescribed Proforma.
- vii. The Compost manufacturer as marketing entity is required to submit a copy of such Certificate issued by the State Government along with the claim for claiming 'On Account' payment for that particular month.
- viii. State Govt. is required to mention clearly the sub-standard quantity of City Compost not eligible for subsidy along with the number of samples and sample number details in Quality Certificate (Proforma B2-CCD) issued by them.
- ix. The claims processed by Fertilizer Accounts Wing shall be submitted for administrative approval of Joint Secretary, Department of Fertilizers dealing with the subject.
- x. Thereafter, the claims shall be sent for concurrence of Internal Finance Division (IFD).
- xi. After concurrence by IFD, sanction for the 'On Account' subsidy amount shall be issued by the Fertilizer Accounts Wing.

- xii. Then P&AO shall release the payment of subsidy as per the prescribed procedure through PFMS.
- xiii. The Compost manufacturer as marketing entity is required to claim through concerned Municipality 'on account' MDA within two months from the month of sale of City Compost.

3. Release of Balance Payment of subsidy:

- (i) If Compost manufacturers as marketing entities submit their claim as per guidelines, the payment of balance MDA on the sale of City Compost shall be released by DoF to the marketing entities based on Proforma 'B2-CCD' issued by the State Governments certifying the quality of City Compost sold during a particular month.
- (ii) The State Governments are required to certify the quality of the City Compost sold by the marketing entity in a particular month.
- (iii) No part certification is allowed.
- (iv) Any quantity found sub-standard shall also be mentioned in the Proforma 'B2-CCD' on which no Market Development Assistance shall be eligible.
- (v) Based on the submission of Proforma 'B2-CCD' by the State Government, the Compost manufacture as marketing entity becomes eligible to claim balance 50% payment of MDA on the sales of City Compost during a particular month.
- (vi) The Fertilizer Accounts Wing shall process the claims as per State Government certification in Proforma 'B1-CCD & B2-CCD'.
- (vii) DoF reserves the right to charge interest plus penal interest on that quantity of City Compost, on which MDA has been paid and later on the State Government certified the said quantity or part thereof non-standard or not sold/sold less in Proforma 'B2-CCD', at the rate prevalent at the time of processing of the claim.
- (viii) The claims for balance payment of MDA shall be processed by Fertilizer Accounts Wing for administrative approval of the Joint Secretary, Department of Fertilizers.
- (ix) Then, the claims shall be sent for concurrence of Internal Finance Division (IFD).
- (x) After concurrence by IFD, sanction for the balance Market Development Assistance amount shall be issued by the Fertilizer Accounts Wing.
- (xi) Then P&AO shall release the payment of subsidy as per the prescribed procedure through PFMS

4. Action to be taken by Fertilizer Accounts Wing in respect of delay or non-receipt of Proforma 'B2-CCD' certificate:

- (i) The Fertilizer Accounts Wing would monitor State-wise receipt of Proforma 'B1-CCD & B2-CCD' and in the event of delay in submission of Proforma B2-CCD' by State Governments, DoF/Fertilizer Accounts Wing will take up with the State Government to submit Proforma 'B2-CCD' at the earliest so that the 'On Account' payment of MDA released to the Compost manufacturer as marketing entity through concerned Municipality could be settled and the balance payment of MDA could also be released. The City Compost manufacturer as marketing entity should also pursue with the State Governments to submit Proforma 'B2-CCD' at the earliest
- (ii) If there is delay of more than 180 days in receipt of Proforma 'B2-CCD' from the State Government, the proforma B2-CCD will be presumed as deemed receipt of proforma B2-CCD.
- (iii) The State Governments are required to send to Fertilizer Accounts Wing, the attested signatures of the authorized signatory who will be signing Proforma 'B2-CCD'. If there is any change in the authorized signatory, the attested signatures of such signatory should be sent to Department of Fertilizers.
- (iv) While issuing Proforma 'B1-CCD & B2-CCD' certificate, Municipality/State Government are required to ensure that:
 - (a) Affixing of rubber stamp and office seal showing name and designation of authorized official certifying the sales;
 - (b) Indication of place and date of signing of Proforma 'B1-CCD & B2-CCD';
 - (c) That the quantity certified in Proforma 'B1-CCD' is the final quantity as partial certification for a given month shall not be accepted;
 - (d) That the format of the enclosed Proforma 'B1-CCD & B2-CCD' is neither changed nor amended; and
 - (e) That Proforma 'B1-CCD & B2-CCD' is not issued with cuttings or correction.

5. Specimen signatures of authorized signatories/ Statutory Auditor of the Company:

- (i) All the claims of Market Development Assistance ('On Account' or balance payment) in prescribed Proforma must be signed by the Chief Executive or his authorized signatory of the company.

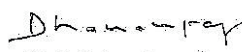
- (ii) The authorized signatory of the claims should be at least of the rank of the General Manager or the Head of Finance Department or holding equivalent post in the company.
- (iii) The attested signatures of the authorized signatory must be sent to the Fertilizer Accounts Wing, DoF initially immediately before any payment is released and also at the beginning of each financial year.
- (iv) There should be maximum two authorized signatories for each company.
- (v) Two copies of three specimen signatures of the authorized signatory, duly attested by the Chief Executive of the Company should be sent to the Fertilizer Accounts Wing, DoF after affixing the official seal.
- (vi) Similarly, the specimen signatures along with name and seal of the Statutory Auditor of the Company should also be submitted by the Compost manufacturer as marketing entity to DoF.

6. Payments through public/private sector bank

Payments shall be made to the Compost manufacturer as marketing entity through Municipality (or Municipality only where Municipality is the Compost manufacturer) by DoF by credit to any public sector bank for which all Municipalities and concerned Compost manufacturers (or Municipality only where Municipality is the Compost manufacturer) are required to open a Joint account (single account) with the Bank. The Municipalities and concerned Compost manufacturers (or Municipality only where Municipality is the Compost manufacturer) also are required to register in PFMS system for the purpose of claiming Market Development Assistance.

7. Others

- (i) All references other than in respect of claims, regarding the City Compost Scheme should be sent in a sealed cover to Joint Secretary, M&E Division, Department of Fertilizers, Shastri Bhawan, New Delhi by registered post/speed post.
- (ii) The Department of Fertilizers may, from time to time, call for any additional information from marketing entities as deemed fit for the smooth and efficient implementation of the Scheme.
- (iii) The above guidelines have the approval of the competent authority.
- (iv) These guidelines have been placed in the web site of the Department of Fertilizers <http://fert.nic.in>


(D P Srivastava)
 Director to the Govt. of India
 Telephone No.: 011-23389839

To

- i. Secretary, Department of Agriculture, Co-operation and Farmers Welfare, Krishi Bhawan, New Delhi
- ii. Chief Secretaries of all States/UTs
- iii. Joint Secretary (PHE), Joint Secretary, Ministry of Urban Development, Nirman Bhawan, New Delhi
- iv. Director (FA), Department of Fertilisers, Udyog Bhawan, New Delhi
- v. Director (Agriculture) of all State Governments/UTs Administration.
- vi. CMD/MD of all fertiliser Companies
- vii. DG, FAI, Shaheed Jit Singh Marg, New Delhi.
- viii. President, Waste Management Association, 4th Floor, Gopal Das Bhawan, 28, Barakhamba Road, New Delhi
- ix. All Officers of Department of Fertilisers
- x. Director (NIC) for uploading on the website.

Annexure-I

To

Joint Secretary
M&E Division
Department of Fertiliser
Shastri Bhawan, New Delhi

It is certified that (*Name of the Company along with address, registration no., etc*) is a Compost manufacturer with manufacturing plant at (*address of location of the plant*) and (*address of registered Office of the Company*) has tie up with (*name and address of the Municipality along with address*) for manufacturing of City compost and is capable of producing City compost on sustainable basis.

**Signature of the Authorized signatory of the State
(Name, Designation with seal)**

Annexure-II

Details of City Compost Manufacturer/ Municipality

- i. Name of City Compost Manufacturing Company
- ii. Address of City Compost Pant
- iii. Address of registered Office of Manufacturer
- iv. TIN No. of manufacturer
- v. PAN No. of manufacturer
- vi. Name and address of Municipal Body with which Manufacturer has the tie up
- vii. Tenure of the contract between Municipal body and manufacturer
- viii. Input of MSW per day
- ix. Installed capacity (Annual in MT)
- x. Brand name of the City Compost
- xi. Contact person name, mobile number and e-mail ID.
- xii. Bank account details like account no., IFSC code, name of account holder (Account should be in Company and Municipality or Municipality's name as the case may be), address of the bank.

Date:

Place:

**Signature of the Authorized signatory of the Company
(Name, Designation with seal)**

Quantity Certificate/On Account Claim

Proforma 'B1-CCD'

For claiming 'On-account' payment of Market Development Assistance by marketing entities under Policy for promotion of CITY COMPOST.

Claim under notification No. ----- dated -----

Bill No.

Date.....

To

The Director (FA), Department of Fertilizers, Room No. 473, Udyog Bhavan, New Delhi
Sir/Madam,

We hereby submit the claim for "on-account" payment of Market Development Assistance as per the particulars submitted below:

1. Name of manufacturer as marketer with address:
2. City compost Brand
3. Claim for the month:
4. Details of the Claim:

| Claim No. | MRP Per M.T. (excluding Local Taxes) (in Rs.) | Name of State/UT in which CITY COMPOST has been sold | Net Qty eligible for payment (in MTs) as per Annexure | Rate. PMT | Market Development Assistance payable (in Rs.) | 50% of total Market Development Assistance as On-A/c amount payable. |
|-----------|---|--|---|-----------|--|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | |
| | | | | | | |

5. Total amount of 'On-account' payment of Market Development Assistance being claimed rounded off to(amount in words).

6. Certified that the net quantity shown in Column 4 in the above table on which Market Development Assistance is being claimed is on net weight basis as per the attached Annexure exclusively for supply of the same to the farmers for agricultural use in bulk. It is certified that the MRP and the Market Development Assistance amount and State subsidy, if any and the quality of this fertilizer sold is conforming to the FCO specifications.

7. It is certified that all the conditions prescribed in the Ministry of Chemicals & Fertilizers (Department of Fertilizers) OM dated 10.02.2016 and guidelines on City Compost have been fulfilled.

8. It is certified that the above-mentioned quantity of City Compost has been sold to the farmers in bulk.

Received an amount of Rs.....

Date:

Place:

Signature of the Authorized signatory of the Company
(Name, Designation with seal)

Please pay the Market Development Assistance amount by crediting it in Account Numberwith.....(Name & Address of the of Bank).....

For <Name of the City Compost Manufacturer as Marketing entity>

Date:

Place:

Signature of the Authorized signatory of the Company
(Name, Designation with seal)

(Verification of the claim by concerned Municipality)

(Auditor's Report on letter head of Auditor)

It is hereby certified that the quantities of City Compost have been sold to the farmers in bulk during the month ofas per the **Annexure** attached herewith.

2. The City Compost sold by (Name of Compost manufacturers as marketing entities) as shown below are hereby certified after duly examining the sale invoices, sale register, delivery challans, Railway Receipts (RRs) for rail dispatch/Lorry Receipts for road dispatches, Stock Transfer Not (STN) and (specify any other record maintained by the Company)

| Sl. No. | Market Assistance claim No. with date | Development claim No. with date | State | Quantity in MTs | Remarks, if any |
|---------|---------------------------------------|---------------------------------|-------|-----------------|-----------------|
| | | | | | |

3. The quantity dispatched from railhead to the registered warehouse/buffer godown/Dealer's stock point is verified from STN/warehouse stock report. The quantity directly dispatched to the farmers as a sale either from plant or from destination rake point is verified from the delivery orders/invoices/STN.

4. The quantity claimed to have been sold by this Compost manufacturer as marketing entity has also been verified from RG-1 register/production record showing production, books of accounts, stock registers and other relevant records maintained by the company.

Place:

Date:

Signature of the Statutory Auditor of the Company
(Name, Membership No. with seal)

ANNEXURE

Company Name:

Month/Year:

Name of State:

| District | Quantity sold (*) | Quantity sold To (**) | Preceding month Quantity returned (not eligible for payment) | Net Quantity eligible | Remarks, if any |
|----------|-------------------|-----------------------|--|-----------------------|-----------------|
| 1 | 2 | 3 | 4 | 5 | 6(3-4) |
| | | | | | |
| | | | | | |

(*Quantity sold of CITY COMPOST manufactured based on MSW)

(** Name, ID card number of the farmers as per details uploaded on iFMS)

Signature of the Statutory Auditor of the Company
(Name, Membership No. with seal)

Date:

Place:

Signature of Company authorized Signatory
(Name, Designation with seal along with date and place)

Proforma B2-CCD

(Quality Certificate for CITY COMPOST)

(to be submitted in duplicate by State/UT within 180 days of receipt of Proforma B1-CCD).

GOVERNMENT OF _____
COMMISSIONERATE OF AGRICULTURE _____ (State)
Dated _____

No. _____
Ref No: _____ Dated _____

QUALITY CERTIFICATE

Joint Secretary(M&E)
Department of Fertilizers
Ministry of Chemicals & Fertilizers
Government of India, New Delhi
(Kind attention: Director(FA), Depart.of Fertilizers, Room No. 473, F-Wing, Udyog Bhawan, N.D

1. Name of State/UT _____
2. Name of the Compost manufacturers as Marketing entities with address _____
3. Date of Inspection _____
4. Inspecting Authority (Name in Capital & Designation) _____
5. Name of Product _____
6. Name of the Brand _____
7. Month/Year _____
8. Batch/Lot Nos inspected _____
9. Quantity test failed if any _____
10. Sampling carried out at _____
(viz Unit premises/Company's warehouse or godowns/Dealer or Retailer premises)

11. It is certified that the Inspecting Authority mentioned above has inspected the said CITY COMPOST unit on the date mentioned above and has found that a well-equipped laboratory as per the FCO to test the samples of CITY COMPOST is functioning in the said CITY COMPOST unit.
12. It is also certified that the samples drawn as above have been tested as per the guidelines of FCO from the State Government Laboratory or from the Laboratory designated by the State Government and as per the Test Report CITY COMPOST manufactured is of the quality as specified under FCO for CITY COMPOST.
13. It is certified that out of _____ number of samples drawn & tested _____ number of samples were failed and _____ MTs of the fertilizers grade for each failed sample amounting to _____ MT shall not be eligible for Market Development Assistance.
14. It is also certified that each cash memo has been stamped with (a) Quality certified (b) Batch No. _____ to (c) Maximum Retail Price (MRP) and (d) Market Development Assistance being given by the Government of India

Director Agriculture
(with Name and Seal)

Place:

Date

Copy to

Claimant Name

Please note that the quality certificate (Proforma-B2-CCD) should be submitted within a period 180 days as stipulated in Notification No. _____ dated _____ issued by Department of Fertilizers.

Proforma 'D'

For claiming balance payment of Market Development Assistance (50%) w.r.t. CITY COMPOST

Claim for Balance payment of Market Development Assistance on CITY COMPOST during the month of against 'On Account' payment of Market Development Assistance received through Bill No. Date..... (Bill No. of 'On Account' payment).

Bill No.

Date:

To

The Director, FA wing, Room No. 473, E-Wing, Udyog Bhawan, New Delhi

Dear Sir/Madam,

We submit the following claim for payment of balance Market Development Assistance:

1. Name and address of manufacturing Company as marketer:
2. Claim for the month in which product(s) sold
3. Details of the claim:

(Quantity in MTs)

| State | Qty. as per "On-A/c" claim (Qty. in MTs) | Sub-standard/short supply (Qty. in MTs) | Qty. sold and eligible for payment (Qty. in MTs) | Rate of Market Development Assistance applicable ** (in Rs.) | Total amount payable (in Rs.) | "On A/c"% of total Market Development Assistance already received (in Rs.) | Balance (%) payable (in Rs.) |
|-------|--|---|--|--|-------------------------------|---|------------------------------|
| (1) | (2) | (3) | (4)=(2)-(3) | (5) | (6)=(4)x(5) | (7) | (8)=(6)-(7) |
| | Total | | | | | | |

5. Total amount of balance payment of NBS claimed being rounded off to (Amount in words)

6. It is certified that the quantity shown in Col.4 above has been sold as per the guidelines issued from time to time by Department of Fertilizers. The above information is based on the proof in respect of sales for the relevant month and is verified from the sale orders, delivery challans and sale invoices/sale bills.

7. The company undertakes that in case any quantity is short certified or the quantity of fertilizer is found to be sub-standard by the concerned State/Union Territory Government (s) as per Proforma 'B1-CCD' then the company is liable to refund the amount along with penal interest to this Department.

8. It is certified that all the conditions prescribed in the Department of Fertilizer's letter No. _____ dated _____ and guidelines dated _____ have been complied.

Received an amount of Rs.

Place: _____ Signature of the Statutory Auditor of the Company
Date: _____ (Name, Membership No. with seal)

Place: _____
Date: _____
Signature and name/designation of the Authorized Signatory of the Company
Company Name with seal

Please pay the Market Development Assistance amount of Rs. _____ by crediting it in
Account Number _____ (specify Bank name branch and address) _____

Place: _____
Date: _____
Signature and name/designation of the Authorized Signatory of the Company
Company Name with seal

(Verification of the claim by Concerned Municipality)

Annexure 2

Concept note on 'Inclusion of additional laboratories for city compost sample testing as per FCO standards'

The processing and use of city waste as compost fully complements the "Swachh Bharat Abhiyan" campaign of Government of India. The city compost, in addition to replenishing the low organic carbon in Indian soils, also has several physical, chemical and biological effects including the supply of micro plant nutrients and the reduction in nitrogen leaching while unlocking fixed phosphorus. Considering the requirement of agriculture sector and production potential of compost by ULBs the city compost is promoted by various national ministries including MoHUA, MoC&F and MoAFW through the Policy on Promotion of City Compost since 2016 (Annex. 1)

The productivity of Agriculture depends on the quality of inputs being used by the farmers. In the fertiliser business, it is required to test the quality of fertilisers to assure the farmer about his production. The city compost despite of its proven benefits on soil and crop yield has chances of contamination by heavy metals if produced through non-segregated waste. Therefore, the end product compost must meet the standards prescribed under Fertilizer Control Order (FCO) notified from time to time in order to ensure safe application of compost to agriculture soils. The FCO standards for city compost are also mentioned in Solid Waste Management Rules 2016 notified by MoEFCC, Govt. of India (Annex. 2)

The city compost production and its usage in agriculture sector is geared up during and post implementation of first phase of Swachh Bharat Abhiyan. Most of the ULBs in country are now having required infrastructure in place for composting from segregated organic waste. This further elaborated the need for adequate number of compost sample testing facilities spread across various regions to ensure periodic and timely testing of compost samples/batches before it reaches to farmers.

As an example, for 400 ULBs in Maharashtra, five Fertiliser Control Laboratories were available at Pune, Nashik, Aurangabad, Amravati and Kolhapur to test the various contents of samples of city compost. These laboratories are already having other testing, certification required as a part of their mandate which resulted in delays in compost sample testing. Therefore, the State government of Maharashtra, considering current compost production rate and potential of reaching to around three lakh metric tons of production in near future felt the need of additional testing facilities for timely testing of compost samples. The city compost samples testing as per FCO standards includes testing of eight heavy metals and micronutrients through advanced chromatography techniques which also required costly inputs. In Maharashtra there are very well-established State Agriculture Universities (SAUs) which are having soil science departments, equipped with modern testing facilities for testing heavy metal content in samples. If these SAU's are mandated to test the city compost samples from ULBs under their jurisdiction on chargeable basis will ensure easy and timely testing of samples as per FCO standards. To overcome the problem of availability of testing facilities and delays in sample testing for ULBs, state government vide circular dated 16th Feb. 2020 (Annex. 3) nominated Mahatma Phule Krushi Vidyapeeth – MPKV (SAU in Maharashtra) for city compost sample testing. Till date MPKV tested around 350 compost samples from more than 100 ULBs and this resulted in timely testing, improvement in quality of compost and overall production/sale of compost in the state. The charges for compost sample tests were same as in case of FCO laboratories and agreed by both state department and MPKV to ensure sustainability of the initiative.

The protocol for inclusion of SAUs for testing city compost samples is as follows:

1. Willingness and interest from SAU for inclusion as city compost testing facility
2. Assessment of laboratory (proposed testing facility) at SAUs to ascertain testing requirements as per FCO standards.

3. Nomination of testing facility at SAU by respective state or national ministry/department on chargeable basis. Financial model for each SAU to be developed with potential number of city compost samples to be (Annex. 4)
4. SAUs to define protocol for city compost sampling, testing and certification with nodal department
5. State department to communicate and direct ULBs to send samples for testing to SAU
6. SAU with their regional centres and extension services promote city compost, establish demonstration plot, crop trials etc.
7. Regular assessment and monitoring of data and provide inputs on composting processes by SAUs.

Annexure 3

Proposed Financial Model for SAU

| | | | |
|----------|---|--------|---------------|
| A | No. of compost production units under SAU jurisdiction | Nos | 50 |
| B | no. of compost samples to be tested by each ULBs as per FCO in one year | Nos | 6 |
| C | Potential/guaranteed no of compost sample to be sent to SAU in one year (A*B) | Nos | 300 |
| D | Rate of testing per sample | INR | 4500 |
| E | Total revenue compost sample testing in one year (C*D) | INR | INR 13,50,000 |
| F | Research associates for compost sample testing, monitoring and MIS | Nos | 2 |
| G | Period of research associate | Months | 12 |
| H | Research associate honorarium/associate/month | INR | 35000 |
| I | Research Associate honorarium/year (F*G*H) | INR | INR 8,40,000 |
| J | Inputs/raw materials (lumpsum) | - | INR 2,00,000 |
| K | Admin expenses @5% (E*5%) | - | INR 67,500 |
| L | Operating expenses for SAU (I+J+K) | | INR 11,07,500 |
| M | Total profit per year for SAU for upgradation of testing facilities, research etc. (E-L) | | INR 2,42,500 |

Annexure 4



In cooperation with:



Satellite-based Soil-Carbon Monitoring

Implemented by the *Fund for the Promotion of Innovation in Agriculture (i4Ag)*
As part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

Including smallholder farmers in the business of validating, protecting and up-building of soil carbon

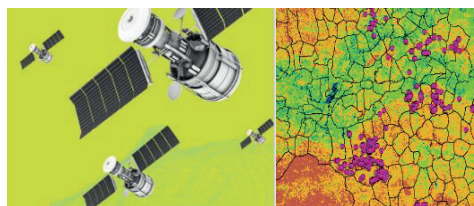
Climate change and soil degradation are two central global challenges. Every year, around 24 billion tons of fertile soil are lost; already, around 25 percent of the earth's surface is degraded. Small and medium-sized farms are severely affected by soil degradation and the effects of climate change. Global greenhouse gas emissions would have to be drastically reduced by 2030 in order to achieve the goal of international climate policy of limiting global warming to below 1.5 °C.

At the same time, agricultural practices, such as the burning of crop residues or deep cultivation, exacerbate the release of greenhouse gases and the degradation of soils. Climate-friendly, soil-conserving cultivation methods such as minimal or no-plow tillage, the addition of mulch and organic fertilizers or the application of cover crops can help stop soil degradation and secure productivity in the long term. As these practices increase carbon sequestration in the soil, they directly contribute to lowering the concentration of carbon dioxide equivalents (CO₂ eq) in the atmosphere. Soil testing and Soil Organic Carbon monitoring has been an integral part of agriculture and climate adaptation-mitigation strategies. Over the last several decades agriculture has benefitted with new technologies and advancements in testing and monitoring methods. However, robust soil data collection, testing and field validations is complicated, expensive and time-consuming.

The Innovation

Economic and effortless capturing of soil organic carbon through satellite data and digital machine learning

To avoid expensive soil sampling, the improved soil carbon is measured via satellite data and innovative machine learning approaches. This will be used to remunerate farmers for soil protection. The generation and sale of carbon dioxide (CO₂) certificates for the voluntary carbon market is an example of existing incentive systems.

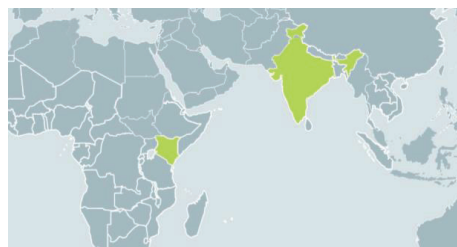


Monitoring SOC using satellite-based machine learning platform

The Main Objective

Capture carbon stored in the soil using satellite-based monitoring approaches

| | |
|-------------------------|---|
| Name of the Project | Satellite-based digital solutions for the valorisation of climate-friendly agriculture |
| Name of the Global Fund | Fund for the Promotion of Innovation in Agriculture (i4Ag) |
| Commissioned by | Federal Ministry for Economic Cooperation and Development (BMZ) |
| Project Region | India, Kenya |
| Implementing Partners | Agricultural Ecosystem Services Trading Initiative (aESTI), VAA-Impact, Spatialise, Earth Analytics India (EAI), Partners in Prosperity (PnP) |
| Duration | 10/2021 – 12/2023 |



R.: India, Kenya

Photo: © aESTI

15,000 tons less of CO₂ emissions measured
6,000 smallholder farms and medium-sized enterprises the certification of soil carbon and carbon credits are prepared

1 digital control platform is available to automate the recording and administration of CO₂eq savings

50% cost reduction of measuring soil carbon build-up per ha of agricultural land with the digital satellite-based method compared to established methods

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



Methodological Approach and Innovation Partnership

Through the development of an open-source satellite-based monitoring and evaluation system for soil organic carbon content on field level, this project aims to develop a digital control platform for automated processing and administration of CO₂ savings. After calibrating the satellite imagery and ground truth data into machine-deep learning algorithm, the developed algorithm will be applied over selected geographies of partners at the micro-, meso- and macro-levels to measure and understand changes in SOC in the field. This allows for the investigation into linkages to the carbon market. Monitoring the carbon sequestration of soil will help generate carbon credits which will not only offset carbon emissions but also provide an income for smallholder farmers.



Satellite based soil moisture analysis Fieldworkers taking soil samples

Important Activities

- Develop, implement, and scale remote sensing-based technologies to monitor the effectiveness of soil enriching strategies.
- Development of a control platform to automate certification and farm monitoring processes
- Initiate steps to verify the methodology of SOC monitoring via remote sensing technology with International Accrediting Agencies
- The project plans to link smallholder farmer aggregators (Farmer Producer Organisations (FPOs) and NGOs) with carbon project developers and certifiers to develop innovative solutions to reward regenerative practices that increase carbon sequestration in soil.

Sustainability and Scaling Strategy

This initiative seeks to translate the learnings generated in the project into a product that can be offered to market participants, whether on a for-profit or non-for-profit business model. The sustainability of platforms developed during the project would be assured if the project were to reach its target of using the methodology to certify carbon offsets into soil. In this case, the methodology could be sold (as a product or as a service) to carbon project developers.

Published by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
 Registered offices Bonn and Eschborn, Germany
 Department G530
 Global Agendas for Food and Nutrition Security
 Fund for the Promotion of Innovation in Agriculture
 Friedrich-Ebert-Allee 32 + 36
 53113 Bonn
 T +49 228 44 60-0
 F +49 228 44 60-17 66
 i4Ag@giz.de
<https://www.giz.de/en/worldwide/94538.html>

As at January 2023

Photo credits Photographer a: aESTI
 Photographer b: PnP
 Photographer c: EA
 Text Jonas Bartholomay & Sumit Anand
 Legal disclaimer This geographical map is for informational purposes only and does not constitute recognition of international boundaries or regions; GIZ makes no claims concerning the validity, accuracy or completeness of the maps nor assumes any liability resulting from the use of the information therein.
 GIZ is responsible for the content of this publication.
 On behalf of Federal Ministry for Economic Cooperation and Development (BMZ)

Annexure 5

Harit Ticker – Digital solution for ensuring access, transparency and effective monitoring of city compost supply chain

The Urban-Rural Nutrient and Carbon Cycle (URNCC) initiative by ProSoil, a project implemented by State of Maharashtra, NABARD and GIZ in State of Maharashtra, works on innovations and models for the urban-rural nexus. Presently around 50,000 metric tons of city compost as per FCO norms is being produced in around 140 urban local bodies and made available to farmers through various channels such as direct sells to farmers, fertilizer distribution companies, farmer collaboratives like FPOs and other local distribution channels. It is estimated that the production potential of compost and demand in agriculture sector presents an opportunity to generate businesses of around 20 million euro every year in state. There are over 10 million farmers, 400 Urban Local Bodies (ULBs) and many FPOs in the state of Maharashtra involved in this business. There were many challenges in ensuring information exchange and access to compost and effective monitoring of quality as it involves multiple players at various levels. Therefore, to increase the efficiency and to connect compost producing ULBs with farmer collaboratives and farmers, digital platform *HARIT Ticker* is developed and being used by the state. *HARIT Ticker* ensures access to city compost to farmer collaboratives, farmers or any other stakeholders who are interested in city compost business. Following are main features of the Harit Ticker:

- **Business application ensuring access to city compost through digital platform:**

Presently around 50000 metric tons of compost as per FCO norms are being produced in 150 urban locations and made available to farmers through various farmers collectives, compost production units and fertilizer distribution networks. It is estimated that the production potential of compost and demand in agriculture sector presents an opportunity to generate businesses of around 20 million Euros every year.

- **Linking compost producers with the farming community:**

Compost producing ULBs are regularly updating information about compost availability, quality standards (test certifications), price of compost etc. on ticker to have access to consumers (farmers, FPOs) spread across the state. FPOs can check nearest compost producing ULB and availability compost along with various other parameters such as quality, price, stock, delivery time etc.

- **Monitoring tool for quantity and quality of compost:**

The application helps the state and urban production units to better manage stock, quality certification, sale, ledgers, production, and distribution. City managers and decision makers can monitor daily production and sales of compost from producers on the app. This real time monitoring addresses many challenges effectively by ensuring regular supply and demand.

Potential for growth

There is potential to use Harit ticker for various other aspects related to compost supply chain in state or at national level as follows:

- **Harit certification process:** Digitalization of compost quality certification process through Harit ticker such as tracking of compost sampling & testing, uploading test reports on ticker, review by state authority and issuance of quality certificates for sale of city compost.

- **Incentive/MDA distribution:** Harit ticker can be used for integration and distribution of proposed incentives for compost production by state government or MDA earlier provided through national ministry.
- **Financial transactions:** Financial transactions between buyers (FPOs) and sellers (ULBs) directly on Harit ticker through well-developed market mechanism to ensure transparency and efficiency.
- **Promotion of city compost and advisories to famers:** promotional materials, advertisements, and advisories on use of compost can be shared through Harit ticker through notifications, messages or both to producers and users. This can be linked with market mechanism to generate revenues to ensure sustainability of digital platform.
- **Integration of other value-added products:** Any other value added products from urban/agri value chain can be integrated and marketed in Harit ticker. Harit ticker can be used for any other product with little customization as per requirements.

The Harit ticker can also be used for other administrative functions associated with these tasks by state.





Soil Protection and Rehabilitation of Degraded
Soil for Food Security (ProSoil)
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH
A2/18 Safdarjung Enclave
New Delhi 110 029 India
T: +91 49 49 5353
F: +91 49 49 5391
E: info@giz.de
I: www.giz.de/india