

This is the sixth in a series of policy briefs for the Climate Smart Initiative (CSI) of the PSNP.

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# Carbon finance opportunities for Ethiopia's PSNP

This policy brief is one of a series produced by the Climate Smart Initiative (CSI), a two-year action research project (2013–15) designed to improve how Ethiopia's national rural safety net deals with climate change issues. This brief considers how the Productive Safety Net Programme (PSNP) can help mitigate or curb the production of greenhouse gases (GHG), one of the main human causes driving climate change. It also considers the potential of international carbon finance, and the CSI's role in developing the evidence base needed to access these funds.

## Introduction

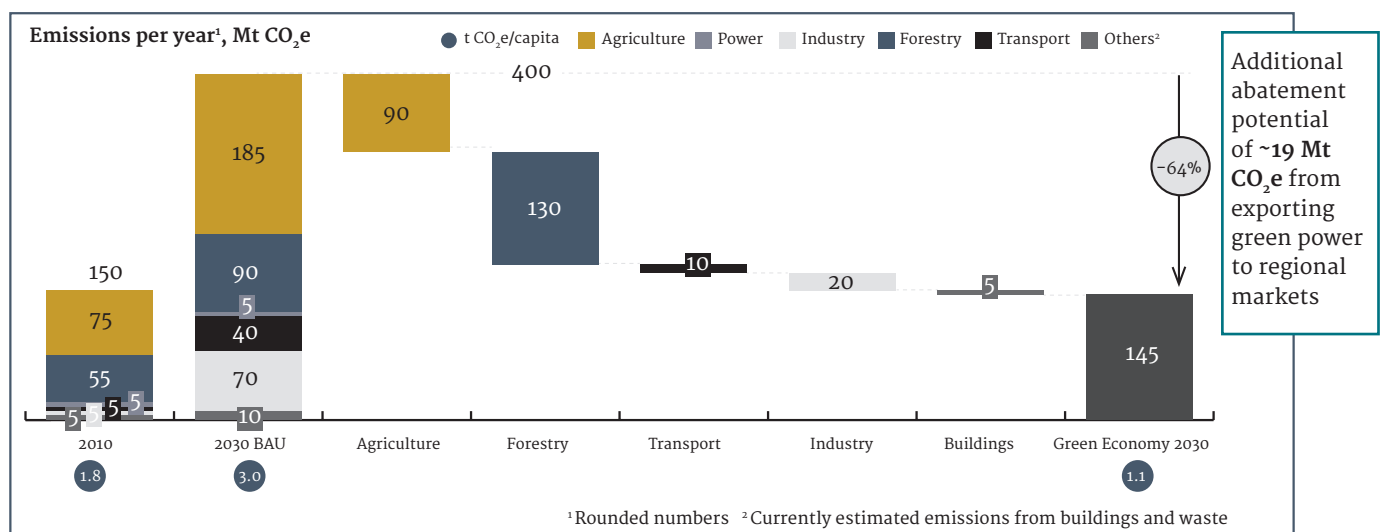
As one of the most climate-vulnerable countries in the world, Ethiopia's prospects are closely tied to its ability to respond to climate shocks and adapt to the impacts of longer-term climate change. In fact, climate-resilient green growth is a major objective of the Ethiopian government's economic policy, as outlined in its Climate-Resilient Green Economy (CRGE) vision,<sup>1</sup> which sets out a vision for sustainable, low-carbon growth. But realising this goal will require both widespread institutional mainstreaming

and considerable financial resources. Ethiopia's national social safety net, the PSNP, is one of the key programmes involved in achieving the CRGE vision, and holds considerable potential to reduce people's vulnerability to climate change as well as support climate change mitigation. Many PSNP activities have the potential to sequester carbon and reduce GHG emissions, so may be eligible for carbon finance – much-needed financing that could scale up and sustain the rural safety net into the future.

## The PSNP and mitigation co-benefits

Ethiopia is largely dependent on smallholder agriculture for food and employment. The agricultural sector, which comprises both cropping and livestock, is also the country's largest source of GHG emissions. Livestock accounts for methane emissions, while cropping contributes to emissions of GHGs including carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) via mechanisms such as soil disturbance from cultivation, burning of crop residues, deforestation to expand farmland, and other management activities that induce changes in land use and land cover. GHG emissions from fertilizer use are relatively low in Ethiopia but are expected to increase as the sector continues to grow and intensify.<sup>2</sup>

In the long term, Ethiopia is aiming to develop a carbon-neutral economy, offsetting all GHG emissions with sequestered carbon. The country is undergoing a period of economic transformation, and emissions are expected to rise markedly if it pursues business-as-usual development. Without significant efforts to capitalise on current mitigation opportunities, it is unlikely that Ethiopia will reach the targets presented in its Intended Nationally Determined Contribution (INDC) recently submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in advance of the Paris Conference of Parties (COP21) (see Figure 1).<sup>3</sup> The INDC sets out Ethiopia's goals to lower emissions and pursue climate-resilient development, as outlined in the CRGE. This establishes the intention to limit net GHG emissions to 145 million metric tonnes of carbon dioxide equivalent (MtCO<sub>2</sub>e) by 2030 – a 64 per cent reduction (255 MtCO<sub>2</sub>e) from the business-as-usual scenario.



**Figure 1. Ethiopia's Intended Nationally Determined Contribution (INDC) submitted to the United Nations Framework Convention on Climate Change (UNFCCC) showing current emissions as well as emissions in 2030 under business-as-usual (BAU) and Green Economy scenarios**

Source: Intended Nationally Determined Contribution (INDC) of the Federal Democratic Republic of Ethiopia, [www4.unfccc.int/submissions/INDC/Submission%20Pages/submissions.aspx](http://www4.unfccc.int/submissions/INDC/Submission%20Pages/submissions.aspx)

The CRGE strategy identifies four mitigation pillars, two of which are particularly relevant to the PSNP:

- forestry: protecting and re-establishing forests for their economic and ecosystem services, including as carbon stocks
- agriculture: improving crop and livestock production practices to increase food security and farmers' incomes while reducing emissions.<sup>4</sup>

Following a business-as-usual scenario, the CRGE estimates that agriculture will account for 185 MtCO<sub>2</sub>e by 2030, accounting for 45 per cent of Ethiopia's emissions<sup>5</sup> (see Figure 1). The CRGE estimates that agriculture has an abatement potential of 90 MtCO<sub>2</sub>e, accounting for around 30 per cent of national abatement potential by 2030. Alongside the agriculture sector, forestry is the largest emitter of GHGs in Ethiopia. Following a business-as-usual scenario, forestry will account for an estimated 90 MtCO<sub>2</sub>e by 2030, representing around a quarter of national emissions by this time. However, of all sectors, forestry also offers

the highest mitigation potential – estimated at 130 MtCO<sub>2</sub>e.<sup>6</sup> Agriculture and forestry combined account for 86 per cent of the abatement potential identified by the CRGE.

The PSNP, through its productive and resilient ecosystem-building measures, already makes a substantial contribution to climate mitigation within the agriculture, forestry and other land use sectors. Recognising the PSNP's capacity to deliver further climate change mitigation, the government is exploring the possibility of leveraging international carbon finance to help support the PSNP's programme of work (see box).

### Carbon offset markets

In recent years, market mechanisms have emerged to facilitate the global reduction of GHG emissions. Carbon offsetting is a process whereby emitters pay to offset their emissions by funding projects that result in carbon sequestration or reduced GHG emissions elsewhere. Carbon offsetting aims to achieve a net GHG emission reduction by supporting actions to reduce carbon in one place, counterbalancing emissions that are difficult or more expensive to curtail in another place.

As carbon dioxide is the most important anthropogenic GHG, the term 'carbon' is often used synonymously with GHGs. Offsets are measured with respect to a carbon dioxide benchmark, typically 'tonnes of carbon dioxide equivalent' (tCO<sub>2</sub>e). This refers to the quantity of CO<sub>2</sub> that would have the same impact on global warming as a mixture of GHGs offset, over a specified time period (typically 100 years).

Broadly speaking, there are two types of carbon market: **compliance markets** and **voluntary offset markets**. **Compliance markets** allow entities to meet regulatory emission reductions commitments: most notably, those compelled by the Kyoto Protocol, the largest binding climate treaty, adopted under the UNFCCC. The Protocol's Clean Development Mechanism (CDM) provides a cap-and-trade approach, where limits are set on emissions, and the rights to emit excess emissions are bought and sold through the sale or purchase of carbon credits, which are generated by projects that mitigate emissions. The CDM allows developing (referred to in the protocol as non-Annex 1) countries such as Ethiopia to create Certified Emissions Reduction (CER) credits, by establishing quantifiable mitigation activities to be purchased by industrialised (Annex 1) countries to meet their regulatory commitments.

**Voluntary offset markets** refer to measures to reduce emissions at the discretion of emitters, rather than for regulatory compliance. Such actions may be motivated by personal conscience, corporate social responsibility, or other reasons. Of the many voluntary offset schemes operating globally, two are of particular relevance to the PSNP – the Verified Carbon Standard (VCS) and the Gold Standard – because of their focus on agricultural, forestry and other land use (AFOLU) methods and their support of developing country projects.

While there is a strong case that the PSNP could qualify for carbon finance for activities that are additional, it is unlikely that either source will provide significant funding for the PSNP in the immediate future (see Recommendations for details).

## Mitigation pathways within the PSNP

The PSNP aims to enhance livelihoods, increase resilience to shocks, and improve food security and nutrition for vulnerable households. Its strategy combines different but complementary interventions: cash and food transfers and social protection services; public works, such as participatory watershed management interventions and construction of community infrastructure; and technical assistance and training to support diversification of livelihood activities. While PSNP activities help to reduce vulnerability to climate change, they also have a number of mitigation co-benefits. For example, many PSNP public works contribute to carbon sequestration by building soil organic carbon, and increasing above-ground biomass.<sup>7,8</sup> They also affect emissions of other GHGs, primarily from the livestock sector. Depending on whether livestock numbers increase or decrease as a result of PSNP activities, associated emissions can rise or fall respectively.

The fourth phase of the PSNP (PSNP 4) – from 2015 to 2020 – aims to ensure that public works and livelihoods support succeed in building climate resilience, while also contributing to the GHG-abatement goals set out the by the CRGE. The PSNP 4 Design Document describes a number of ways in which these efforts can be furthered, including by:

- continuing to develop and adapt climate-sensitive activities
- adapting public works and livelihood guidelines to be climate sensitive and to include low-carbon and low-regret options
- monitoring the impact of climate change by establishing a baseline against which to measure the carbon sequestration results of programme activities, and thus pave the way to access climate funding.<sup>9,10,11</sup>

Figure 2. PSNP's CSI watershed sites in Ethiopia

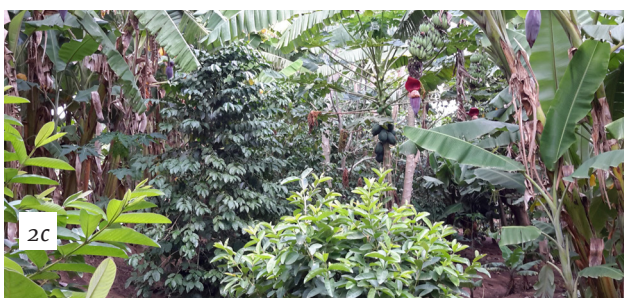


Figure 2a shows a severely degraded woodland adjacent to a woodland area enclosure in SNNPR regional state, while Figure 2b illustrates a severely degraded grassland adjacent to a grassland area enclosure in Afar regional state. Figures 2c and 2d show examples of multi-story agroforestry systems and highly diversified croplands with proper integrated soil and water conservation and soil fertility management measures implemented in SNNPR.

Livelihood strengthening measures in the PSNP support low-carbon development through establishment of area enclosures, agroforestry, and improved cropping and livestock husbandry practices, which have the potential to reduce GHG emissions and/or remove carbon from the atmosphere (see Figure 2). PSNP 4 incorporates a number of elements that can strengthen the programme's contribution to climate change mitigation. These include:

- a renewed focus on sustainability in establishing and rehabilitating community assets
- the identification of low-carbon graduation pathways, such as measures within crop and livestock value chains, and off-farm livelihoods.

### **Sustainable community assets**

In PSNP areas, soils are often degraded and low in organic carbon. A significant portion of PSNP public works comprise participatory watershed management interventions, such as integrated soil and water conservation, erosion and flood control measures, afforestation/reforestation, cut-and-carry fodder systems, and agroforestry. These hold potential to rehabilitate degraded lands, improve smallholder livelihoods, and boost food security.<sup>12,13</sup> They also have considerable knock-on effects for climate resilience by improving soil fertility and water retention capacity, expanding access to water for agricultural purposes and other domestic use, and by providing access to forage and fuelwood.

### **Livelihoods pathways**

To achieve the mitigation goals established in the CRGE, the PSNP can support the following measures:

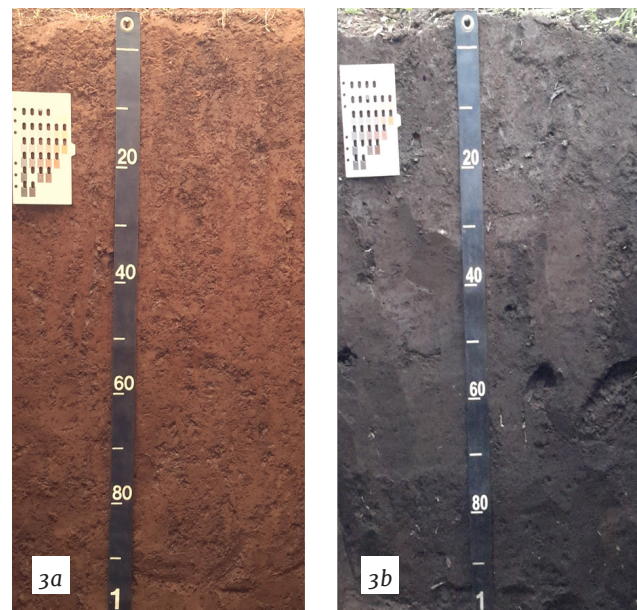
1. Reduce the rate of GHG emissions per unit output by adopting integrated soil fertility management measures that include use of organic amendments, crop rotation, intercropping, minimum tillage, agroforestry, improved management and irrigation;
2. Introduce high-yielding, disease-resistant and high-value crops provided that the selected varieties have proven drought tolerance, are well adapted to local conditions, and are cost-effective and productive under the low-input management systems that prevails in PSNP households;
3. Support low-carbon farming via appropriate technology transfer and value chain support from the government and other stakeholders;
4. Increase productivity and efficiency of the livestock sector by prioritising increased animal value chain efficiency, reducing consumption of high-emitting animal proteins by encouraging people to increase consumption of lower-emitting sources (e.g. poultry) and non-animal protein sources. Although some observers recommend improved rangeland management as a mitigation pathway, there is low evidence and little consensus that the GHG-abatement potential from this would be easy to achieve. The GHG modelling of PSNP sites conducted within CSI found that, although rangeland improvements can increase soil carbon, there is a corresponding increase in forage production that translates to increased emissions from livestock – which more than offset the soil carbon benefit;

5. PSNP 4 can support off-farm employment opportunities, particularly for young people who have limited access to land and therefore traditional crop and livestock-based livelihoods. The CSI has demonstrated that the PSNP can promote off-farm activities with mitigation potential, such as the development of value chains for energy-efficient cookstoves and biogas. A number of these options, such as improved cookstoves, have already been identified in the CRGE and the more recent Growth and Transformation Plan (GTP II). Fuel-efficient cookstoves are earmarked for fast-track finance under the CRGE, and the Ethiopian government has committed to deploying 9 million cookstoves as part of the National Improved Cookstoves Programme.

Fuel-efficient, clean-burning cookstoves decrease fuel input needs, thereby reducing deforestation. They also have a number of other benefits such as improving indoor air quality and public health outcomes as well as reducing the work burden on women and girls who are typically responsible for gathering fuelwood. CSI piloted the roll-out of energy-efficient cookstoves in a number of watersheds. Initial Climate Vulnerability and Capacity Analysis conducted at watershed level indicated that access to fuelwood is a problem in more than a quarter of watersheds.<sup>14</sup> Following this assessment, the CSI established producer groups to support the production of fuel-efficient stoves to help address this need. Stove production and sales provide promising off-farm, low-carbon, income-generating activities. However, more work is needed to raise awareness of the value of efficient stoves to encourage uptake. CSI proposes more public-private partnerships, social marketing and increased local production of cookstoves to help realise this goal.

## Carbon benefits of PSNP interventions

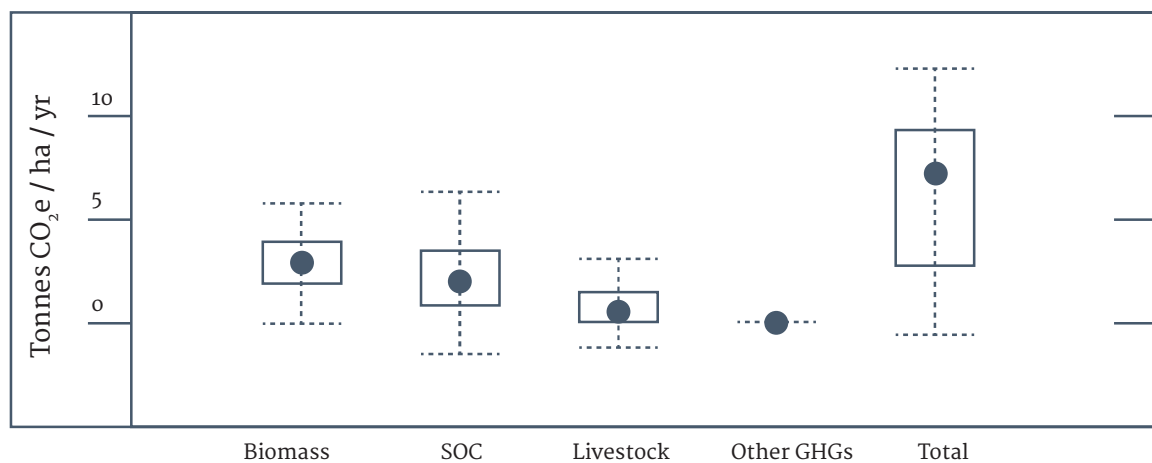
*Figure 3. Representative photos of red soil profiles collected from cultivated land without any form of integrated watershed management (Fig 3a) and dark-coloured soil profiles from farmland under an agroforestry system (Fig 3b) as part of PSNP's integrated watershed management intervention in Damot Gale, CSI woreda, in SNNPR. The dark colour in the agroforestry soil profile (3b) indicates the high soil carbon, organic matter and fertility status of soils under improved management.*



The PSNP 4 seeks to monitor its impact on climate change by establishing a baseline to prove that carbon sequestration results from programme activities, which would mean it could access climate funding. As a contribution to this goal, CSI sought to measure the mitigation potential of PSNP-implemented climate-smart land use interventions. These include area enclosures, cut-and-carry forage systems, agroforestry, afforestation/reforestation, rangeland restoration, and integrated soil and water conservation practices (see Figure 3). The suite of interventions deployed at any given PSNP site is tailored to its unique biophysical, climatic and cultural characteristics. The CSI predicted the mitigation potential of PSNP interventions using field measurements and modelling techniques at 28 sites across six Ethiopian regions.

Using the Intergovernmental Panel on Climate Change (IPCC) Tier 1 and 2 methodologies, the mean carbon benefit across all CSI sites was estimated at 5.7 tCO<sub>2</sub>e ha<sup>-1</sup> yr<sup>-1</sup>.<sup>15</sup>

These results show that there is high mitigation potential within PSNP 4. However, in order to access carbon markets, a number of conditions need to be met. The following section explores some of the key issues and obstacles to be overcome if PSNP 4 is to successfully access carbon finance.



**Summary of IPCC Tier 1 assessment carbon benefits by GHG flux category aggregated over 28 modelled sites.** Black dots indicate median values, and boxes show interquartile range. 'SOC' is soil organic carbon. The 'other GHGs' category refers to other sources and sinks of greenhouse gases not included in the other categories, notably fertilizer and fire. (Reprinted from Jirka et al, 2015).<sup>16</sup>

Biomass and soil organic carbon (SOC) accumulation were the largest sinks of GHG fluxes contributing to the overall carbon benefit (i.e. the difference between PSNP interventions and business-as-usual scenarios), contributing on average 2.3 and 2.2 tCO<sub>2</sub>e ha<sup>-1</sup> yr<sup>-1</sup>, respectively, followed by reduced emissions of methane from livestock management at 1.3 tCO<sub>2</sub>e ha<sup>-1</sup> yr<sup>-1</sup>. Contributions from other GHG fluxes (primarily attributable to fertilizer management) were negligible due to the low impact of PSNP on inorganic fertilizer use in Ethiopia. Variability between PSNP sites was substantial (standard deviation 6.1 tCO<sub>2</sub>e ha<sup>-1</sup> yr<sup>-1</sup>), underscoring large differences across the landscape in potential carbon benefits. Nonetheless, at some sites the net carbon benefit exceeded 10 tCO<sub>2</sub>e ha<sup>-1</sup> yr<sup>-1</sup>.

When considering that Ethiopia's PSNP interventions cover hundreds of thousands of hectares, the potential for PSNP to have a meaningful impact on climate change mitigation is compelling.<sup>17,18</sup>

# Recommendations for accessing carbon finance

## Adopt a landscape approach

The PSNP is a large programme covering a wide geographic area. Its scope is broad; it covers many diverse practices and addresses a range of issues, from poverty alleviation, food security and development, to climate change mitigation. The programme's magnitude and its comprehensive nature pose a challenge to accessing AFOLU carbon markets, which have been more oriented towards smaller projects promoted on a 'one place, one function' basis. For example, an afforestation project must provide assurance that a new forest will remain sufficiently intact to realise the expected mitigation benefit, limiting the scope for other land uses. This approach may be viable in areas of low population, but in PSNP woredas, where beneficiaries rely on the land for multiple uses, committing to one particular use is problematic.

The PSNP should explore a landscape approach as a means to developing carbon projects. In recent years, alternative approaches to carbon project development have emerged to address the issue of scale. Jurisdictional approaches seek to curb emissions over a larger area, grouping activities within the landscape. Rather than consider a single land use, this approach considers a landscape as a system comprising many land types, institutions, stakeholders and land uses. For a carbon mitigation project, a landscape approach seeks to quantify the aggregate mitigation benefit for a particular jurisdiction, given a variety of characteristics – social, economic and ecological. Such projects typically cover sub-national jurisdictions, such as regional states in Ethiopia, comprising multiple land uses and land cover types.<sup>19</sup>

One criticism levelled at smaller projects is that the cost involved in applying for and accessing carbon finance can outweigh

the benefits associated with receiving it. Clustering activities across jurisdictional landscapes would help reduce the higher transaction costs associated with numerous smaller projects. Furthermore, undertaking projects over a larger geographical scale can reduce the likelihood of 'leakage' (when carbon projects in one area create other land use impacts outside of the project boundary, counteracting the mitigation benefits within the project area).<sup>20</sup>

Oromia's Forested Landscape Programme – supported by the BioCarbon Fund – is the first Ethiopian project to pursue a jurisdictional landscape approach. The lessons from this programme could help support the development of carbon projects within the PSNP. At the present time, standardised methods that use jurisdictional carbon accounting are being piloted by the Verified Carbon Standard (VCS). The expectation is that, over time, compliance and other voluntary markets will also move to adopt these standardised methods.

## Undertake preparatory work to facilitate scaling-up

In time, it may be possible to aggregate PSNP mitigation activities in regional carbon projects. However, at present, the market volume is not sufficiently large to match projects at this scale. Despite this, there are encouraging signs that the Conference of Parties (COP21) later this year (7–8 December) will yield binding GHG reduction targets, which could spur further development of carbon offset markets by increasing demand for carbon credits. While there is uncertainty around the future of carbon markets, PSNP 4 should commit to the following:

1. Undertake groundwork to build the institutional and technical capacity necessary to develop carbon projects rapidly and at scale. Ethiopia, and the PSNP in particular, must be well positioned to capitalise on the changing carbon market landscape.



2. Continue to pilot smaller carbon projects to hone project development expertise and improve readiness. This process will help standardise project development, monitoring, verification and reporting, and carbon accounting, thereby reducing the transaction costs associated with individual project development, so building economies of scale.
3. Pursue innovative, low-cost methods for data collection. These include remote sensing, geospatial analysis, and novel soil carbon quantification such as mid-infrared soil analysis piloted during the CSI.
4. Ensure active engagement with broader CRGE processes. These recommendations are well aligned with ongoing efforts led by the CRGE Unit within the Ministry of Agriculture, as well as wider CRGE processes. It is particularly important that the PSNP links with the CRGE Facility, the Ethiopian government's mechanism for channelling climate finance.

### Ensure additionality

Additionality is a key requirement of carbon finance: projects must make a case that actions would not occur in the absence of financial support from carbon markets. At present, it is difficult for the PSNP to demonstrate additionality, as the programme has already been initiated and activities are taking place in the absence of carbon finance.<sup>21</sup> However, it could make a case for additionality if carbon finance were to ensure the continuation of the PSNP in the event that present funding were discontinued, or if finance allowed the further expansion or enhanced sequestration of existing programme activities.

PSNP 4 should continue the development of a national carbon baseline database. The groundwork for such a database has been laid, as CSI sought to do so, developing models to predict the effects on carbon sequestration, and a variety of ecosystem

services, based on scaling up the PSNP to other areas.<sup>22</sup> This information can support the case for carbon finance.

### Pursue non-market climate finance options

While carbon markets represent a promising future funding source for the PSNP's mitigation activities, the market is not currently in a state to deliver transformative finance. Bilateral and multilateral agencies currently provide the main source of both mitigation and adaptation finance, and constitute much more promising funding opportunities for the PSNP than carbon markets do in the short term.<sup>23</sup> Between 2010 and 2012, annual climate finance flows from developed to developing countries channelled from public institutions amounted to between US\$35 billion and US\$50 billion,<sup>24</sup> far exceeding revenue from Clean Development Mechanism (CDM) Certified Emission Reduction (CER) sales (these were estimated at between US\$3.5 billion and US\$4 billion<sup>25</sup> and have since dropped markedly). The voluntary carbon market is smaller still, estimated at around US\$587 million in 2011.<sup>26</sup>

### The PSNP should pursue non-market mitigation and adaptation finance.

Adaptation is not a focus of this brief. However, the PSNP is driven more by adaptation than mitigation. While globally, international climate finance from bilateral and multilateral institutions favours mitigation, in sub-Saharan Africa half of all pledges are for adaptation.<sup>27</sup> There are a number of potential sources of adaptation finance that the PSNP could consider. The most prominent emerging source of both adaptation and mitigation finance is the Green Climate Fund, which aims to 'promote the paradigm shift towards low-emission and climate-resilient development pathways'. The Fund was launched in 2014 with initial pledges of US\$10.2 billion, aiming to reach US\$100 billion annually by 2020. It has six investment criteria, all highly relevant to Ethiopia's PSNP: (1) climate impact potential; (2) paradigm shift potential; (3) sustainable development potential; (4) needs of the

recipient; (5) country ownership; and (6) efficiency and effectiveness. Furthermore, Ethiopia has already undertaken preparatory work to access this Fund, and plans to submit a proposal seeking multi-sectoral support. It is vital that the PSNP is a part of this process.

## Conclusion

It has been demonstrated that Ethiopia's PSNP contributes to climate change mitigation. PSNP 4, the latest iteration, will continue this trend by supporting climate-smart natural resources, agricultural and animal husbandry management practices, and promoting off-farm livelihoods that support mitigation such as the production of fuel-efficient cookstoves, and promotion of additional ecosystem services and co-benefits. Such mitigation potential offers scope to access international carbon finance, but a number of barriers must be overcome if this is to be realised. The PSNP is not appropriate for a 'one place, one function' carbon finance approach. A landscape approach offers the potential to address the issue of scale and diversity of sustainable land use practices by grouping a number of carbon sequestering land uses covering greater areas, thus reducing transaction costs and leakage.

However, at present, carbon markets are not sufficiently developed to match a project at the scale of the PSNP, though there is a possibility that this may change in the near future should international negotiations yield binding caps on GHG emissions, which will increase demand for carbon projects. In the meantime, the PSNP should put in place the institutional and technical capacity necessary to capitalise on this potential opportunity when it arises, and develop smaller pilot projects to build expertise and leverage smaller funds in the meantime. Carbon markets are only one source of climate finance; the PSNP should also pursue non-market mitigation as well as adaptation finance.

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