

# Harnessing employment-based social assistance programs to scale up nature-based climate action

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## Summary

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As the severity of the twin global ecological crises of accelerating climate change and biodiversity loss becomes clearer, governments and international development institutions must find effective policy instruments to respond. We examine the potential of social assistance policies in this context. Social assistance refers to transfers to poor, vulnerable, and marginalized groups to reduce their vulnerability and livelihood risks, and to enhance their rights and status. Substantial public funds support social assistance programs globally. Collectively Lower and Middle Income Countries spend ~1.5% of their GDP on social assistance annually. We focus on the potential of social assistance programs offering paid employment to promote effective ecosystem stewardship. Available evidence suggests such programs can offer multiple benefits in terms of improvements in local ecosystems and natural capital, carbon sequestration, and local biodiversity conservation. We review evidence from three key case studies: in India (the Mahatma Gandhi National Rural Employment Guarantee Scheme), Ethiopia (the Productive Safety Nets Program) and Mexico (the Temporary Employment Program). We conclude that, to realize the potential of employment-based social assistance for ecosystem benefits it will be necessary to address two challenges. First, the weak design and maintenance of local public works outputs in many schemes, and second, the concern that social protection schemes may become less effective if they are overburdened with additional objectives. Overcoming these challenges requires an evolution of institutional systems for delivering social assistance to enable a more effective combination of social and environmental objectives.

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## 1. Introduction

Two recent authoritative reports by UN bodies have combined to create heightened public awareness of what has been termed the ‘planetary’ or ‘ecological’ crisis: the Intergovernmental Panel on Climate Change (IPCC) Special Report on Global Warming of 1.5 °C (SR15) (IPCC 2018), and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) global assessment report (IPBES 2019). The former highlighted the urgency of the climate crisis. It underlined the compelling need to bring global greenhouse gas emissions to net zero by 2050 and to speed up efforts at supporting local adaptation and resilience, particularly in more vulnerable countries. The latter outlined the shocking scale of biodiversity loss. It also provided disturbing evidence that 0.5-1M plant and animal species will go extinct over the coming decades. Such a loss, the report concluded, would severely impact prospects of sustainable development.

Therefore, there is an urgent need for policy communities to find instruments that effectively address the multiple dimensions of planetary crises at scale. This Perspective highlights the potential of social assistance instruments to enhance global efforts for environmental action (Kuriakose et al. 2013, Schwan and Yu 2017). It also identifies the need for better evidence on their potential, and suggests specific actions that can help realize this potential.

Substantial public funds support social assistance globally. Social assistance refers to transfers to poor, vulnerable, and marginalized groups to reduce their vulnerability and livelihood risks and to enhance their rights and status (Devereux and Sabates-Wheeler 2004). In Lower and Middle Income Countries (L&MICs), social assistance includes programs such as cash and in-kind transfers and initiatives to create public infrastructure by offering employment to those looking for jobs. Collectively, social assistance in the L&MICs adds up to approximately 1.5% of their GDP (World Bank 2018, 2019). Investments in social assistance are far higher in richer countries (ILO 2017). Iconic social assistance programs such as the *Progres*a and *Oportunidades* in Mexico and *Bolsa Familia* in Brazil have made such interventions familiar across the world (Lagarde et al. 2007, Schultz 2004, Soares et al. 2010). Here we focus in particular on social assistance programs that focus on employment guarantees and public works creation. We refer to them collectively as employment schemes (Subbarao et al. 2013). They cover more than 100 million people in the L&MICs.

Interventions designed to support climate action and the protection of biodiversity are, in contrast, struggling to reach the scale of delivery needed to address the scope and extent of challenges societies face. In the L&MICs, these interventions need to focus

72 fundamentally on delivering development and tackling poverty whilst transforming  
ecosystem stewardship and supporting effective climate action.

75 This paper focuses in particular on employment schemes (Adam 2015, Camacho et  
al. 2013) rather than more widely implemented cash and in-kind transfer initiatives (Bastagli  
et al. 2019, Sadoulet et al. 2001) because of their potential to create assets that support  
collective ecosystem stewardship. Employment schemes provide recipients the opportunity  
78 to work on creation of natural or built infrastructure and can also incorporate elements such  
as strengthening of local institutions and provision of new skills. Cash and in-kind transfers  
are simpler in conception and implementation – they essentially transfer specified amounts  
81 of money or in-kind resources such as food to beneficiaries targeted due to the poverty of  
the households or their stage in the lifecycle (children and the elderly). Employment  
schemes thus incorporate a larger number of policy tools for decision makers including  
84 improving collective decision making at the local level. The availability of multiple tools  
requires more coordination by implementing agencies, but also offers greater potential for  
flexibility and targeting in comparison to a simple cash or in-kind transfer when policy  
87 responses need to be modulated to different kinds of environmental crises.

Employment schemes can achieve both socioeconomic and ecosystems-related  
goals as several existing assessments already show (Adato et al. 2005, Kaur et al. 2019).  
90 Despite their greater complexity in comparison to programs that transfer resources in cash  
or kind most assessments of these programs suggest that they enable positive social and  
economic outcomes (Mackintosh and Blomquist 2003, Kluve et al. 2019, Sakketa and von  
93 Braun 2019). The experience of employment schemes in countries such as India, Ethiopia  
and Mexico – the three countries on which this paper focuses given their high levels of  
poverty, threatened ecosystems, and exposure to climate risks – suggests they also hold  
96 promise in relation to ecosystem objectives. The larger-scale development and deployment  
of their employment schemes can help realize environmental protection objectives set out  
in the climate and other environmental plans of these countries. Assistance to poor families  
99 through these programs often incorporates actions on ecosystems and natural resources.  
This is unsurprising because many employment schemes trace their origins to hydro-  
meteorological disasters such as droughts, famines, flooding, and storms, and the shortfalls  
102 in consumption that such disasters precipitate (Besley and Coate 1992).

Our focus on the employment schemes in India, Ethiopia, and Mexico to illustrate  
the relevance of these programs is important for other reasons as well. All three countries,  
105 in common with other L&MICs, have made substantial international commitments for

emission reduction, protection of vulnerable ecosystems and communities, and biodiversity conservation in support of biodiversity targets and the Paris climate agreement (UNFCCC 2015a, 2015b, 2015c, Seddon et al. 2019a). In each of these countries large-scale employment schemes already contain environmental objectives such as ecosystem protection, conservation of land, water, and soils, and recovery from climate-related disasters. More deliberate and careful coupling of social, economic, and environmental objectives through social assistance can also help them meet their international commitments.

Social assistance schemes can have ecosystem stewardship objectives integrated in their core delivery systems – but to realize these objectives they also need to be resourced with the necessary technical skills and financial means. Alternatively, governments and implementing agencies can seek to bring together distinct social assistance and ecological stewardship schemes for greater socio-ecological effectiveness: with one providing the expertise and the budget for materials, the other providing a workforce. Indeed, technical skills needed for careful design, durable construction, and long-term maintenance of environmental assets in public work schemes have often been missing (Banerjee and Saha, 2010; MGNREGA Division, 2017, Shah, 2016). And although ecosystem stewardship schemes are often technically robust, their geographic reach is generally limited with the exception of some programs in China and Brazil (Porrás and Asquith, 2018). Bringing the strengths of both together could offer value in responding to the global challenges we are currently facing.

The idea of using public funds at scale to mobilize labor through employment guarantees and achieve environmental goals is also gaining some support in higher-income countries. An important example is the Resolution submitted to the US Congress by Congresswoman Ocasio-Cortez on the ‘Green New Deal’.<sup>1</sup> The proposal is wide-ranging, and includes ambitious goals to decarbonize the energy system of the US, to preserve ecosystems, to reduce inequality, to create green jobs, and to broaden access to higher education (Barbier 2019). The Resolution proposes both a ‘jobs guarantee’ and widespread action to restore ecosystems through ‘locally appropriate and science-based projects that enhance biodiversity and support climate resiliency’. Critics of this proposal, especially in the popular press, have raised concerns about feasibility and costs of such public mobilization of resources even as others have analyzed how to pay for it (Nersisyan and Wray 2019).

Here we highlight that employment schemes are already being implemented at a vast scale. One of the world’s largest social assistance programs – the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) in India – includes 120 Million

active workers and generated upwards of 2.5 billion person days of work in 2018 (MGNREGS Portal 2019)). A substantial part of the labor supported through this intervention is directed at environmental objectives of soil and water conservation, ground water recharge, tree plantations, and land improvement (Bhaskar et al. 2016, MGNREGS portal 2019).

In more than 80 nations, similar programs reach 20 million households with a resurgence of such programs in sub-Saharan Africa (Sakketa and von Braun 2019: 7-10). Governments in these countries spend upwards of 20 billion dollars on employment schemes annually to create household and community level infrastructure (World Bank 2018, 2019). These investments in employment schemes rival total annual global expenditures on conservation – currently estimated as US\$ 21.5 Billion (Waldron et al. 2013). Through investments in public works, governments have supported initiatives to protect ecosystem services, govern land and water, and improve soil conservation. They have done so by spending on labor for local environmental public works as also by providing incentives for better natural resource management, eg., by allowing program funds to be used for water conservation and flood control infrastructure improvements on private lands as is the case for the MGNREGS in India (Giribabu 2019)

Drawing upon the experience of existing social assistance programs that seek to mobilize labor for socioeconomic and environmental goals, we suggest that employment schemes social assistance have the potential for better stewardship of ecosystems on a large scale. Increased investments in employment schemes social assistance can enhance natural capital and improve the provision of ecosystem services. Benefits from such provision potential include greater local resilience to the impacts of climate change and disasters, improved conservation of local biodiversity, and reduction of climate change risks via enhanced carbon sequestration, reduced exposure, and improvements in adaptive capacities. But achieving both social and environmental goals will require changes in how employment schemes are implemented. In most cases it will also necessitate some changes in design and in partners to align objectives with impact pathways. But the payoff to such revisions can be substantial when it comes to securing positive outcomes for socioeconomic and ecosystems.

The political logic of combining social policy with ecosystem stewardship and climate adaptation objectives is compelling – the very poorest will be hardest hit by the climate and biodiversity crises and will need ever greater support social assistance if these challenges remain unaddressed. It is indeed a common thread between such seemingly different initiatives as the Green New Deal proposal in the United States and MGNREGS in India. After

174 providing a bird's eye view of social assistance in the lower and middle income world since  
the 1990s, we provide a more detailed consideration of investments in employment  
schemes in India, Ethiopia, and Mexico. Then we examine the steps needed to increase  
177 further the potential of social assistance interventions to support the management of  
resilient ecosystems for sequestering carbon, supporting biodiversity and securing the flow  
of ecosystem services.

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## 2. Social assistance and Employment Schemes

Social assistance has been variously defined by researchers and practitioners across fields such as disaster studies, development studies, and international aid, and across rights and growth orientations (Devereux et al. 2018). Broadly, social assistance can be viewed as public actions in response to socially unacceptable levels of vulnerability, risk and deprivation (Norton et al, 2001, Devereux and Sabates-Wheeler 2004). Informal social assistance remains critical for many households especially in poorer parts of the world (Norton et al. 2001, Devereux and Sabates-Wheeler 2004, Fiszbein 2009). But formal social assistance has grown rapidly in L&MICs to help allay the worst effects of acute poverty and open pathways towards higher incomes where feasible.

Shifts in levels of expenditures and coverage of people through social assistance are occurring even in the context of continuing debates over how much to allocate to social assistance, how effective social assistance is in achieving its aims, and what forms of social assistance are the most effective (Barrientos and Hulme 2009). Such urgency stems both because of the extent to which the impacts of climate change and biodiversity loss (Roe et al 2019) may undermine past achievements of poverty reduction and because of limited knowledge about how to structure social assistance for greater effectiveness.

Table 1 provides estimates of expenditures on social assistance by major regions in the lower and middle income world. Aggregate expenditures on social assistance in 2017 were nearly 500 billion dollars and have increased by more than a hundred billion dollars from 2014 to 2017 (World Bank 2015, 2018).

**Table 1: Estimated Social assistance (SP) Expenditures: LMICs**

Region	Total GDP (\$T)	% GDP on SP	Dollar on SP (\$B)
E. Asia & Pacific	14.7	1.1	162.0
Europe & C. Asia	3.3	2.2	72.6
L. America & Caribbean	5.9	1.5	89.6
Middle East & N. Africa	3.3	1.0	32.8
S. Asia	3.3	0.9	29.6
Sub-Saharan Africa	1.7	1.5	25.1
Total LMICs	32.2	1.5	483.6

(Based on World Bank 2018; GDP numbers from <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD> and <https://data.worldbank.org/indicator/SP.POP.TOTL>)

In higher-income countries, employment schemes fall into three different categories: employment services which help job seekers find jobs, training schemes which

help in the reskilling and training of potential employees, and subsidies to support those who are not working but undergoing training or actively seeking employment (Betcherman et al. 2004, Card et al. 2017). In contrast, in poor and middle income countries, employment benefits often occur as provision of work for a specified number of days, or, as in the case of India, a specified number of days guaranteed as a right (See table 2 for the largest employment schemes in LMICs). Such benefits are typically coupled with the development and creation of infrastructure, protection of natural capital and ecosystems, and at times with training programs and efforts at strengthening local institutions. In some countries, employment schemes are targeted to the poorest, based on a means-test of those with incomes below a specified level. But enforcing means-testing and ensuring that the poorest are aware of their rights is both challenging and costly (Das 2019). Setting wages below market rates in such situations leads to self-targeting by poor households that have surplus labor, but also means that labor-constrained or better off households are less likely to benefit from the employment schemes.

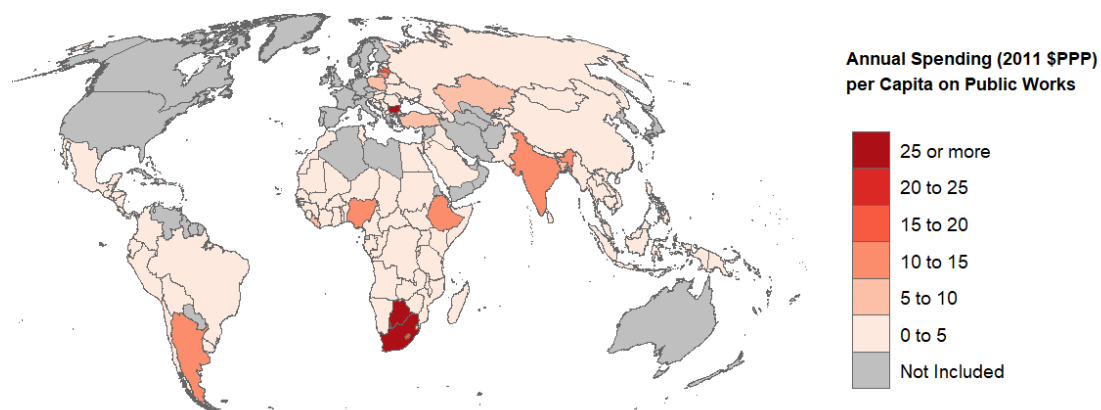
Table 2: Lower and middle income countries with employment schemes  
(Threshold of 250,000 people receiving benefits) (World Bank 2018)

Country	Program Name	People covered (000s)	Year
Bangladesh	Employment Generation Program for the Poorest	1,400	2014
Brazil	Economia Solidaria	534	2012
Congo (DRC)	Economic Recovery Project	588	2016
Ethiopia	Productive Safety Net Program	7,997	2016
Haiti	National Project of Community Participation	450	2009
Hungary	Public Works Program	329	2015
India	Mahatma Gandhi National Employment Guarantee Scheme	75,287	2016
Kenya	Cash for Assets	300	2016
Madagascar	PUPIRV	377	2013
Malawi	Public Works Program	2,623	2014
Mexico	Programa de Empleo Temporal Ampliado	1,441	2014
Mozambique	Productive Social Action Program	283	2015
Nepal	Karnali Employment Program	323	2104
Nigeria	Input for Works Program	720	2015
Pakistan	Community Physical Infrastructure	3,118	2016
Russia	Organization of Temporary Employment	812	2013
South Africa	Extended Public Works Program	350	2013
Yemen	Labor Intensive Works (Social Fund for Development)	400	2017
Zimbabwe	Food Deficit Mitigation Program	756	2015



A number of schemes not represented in the list above also involve ecosystem stewardship – such as South Africa’s Work for Water scheme where the watersheds of towns and cities are protected while providing work and new skills for the unemployed (Binns et al. 2001, Marais and Mlilo 2018, Turpie et al. 2008). Figure 1 below provides a graphic representation of how similar programs, albeit at a smaller scale, are distributed across another 80 countries in the LMICs based on per capita spending for the country’s population.

Figure 1: Per Capita Spending on Employment Schemes across the LMICs



### 3. Employment Schemes in India, Ethiopia, and Mexico

The three countries with the highest coverage of beneficiaries across Asia, Africa, and Latin America through employment-based social assistance are India, Ethiopia, and Mexico. Each has high levels of poverty and substantial inequalities. They are vulnerable to climate impacts. Their forests and grazing ecosystems are threatened. Water scarcity is already or becoming urgent in many parts of these countries. And in addition, declining productivity and soil losses adversely affect agriculture. We discuss the history, core components, outcomes, and where evidence is available, the potential for ecosystem protection through employment schemes in each.

#### 3.1 MGNREGS in India

The origins of employment programs in India can be traced to famines during the colonial period and earlier when colonial and precolonial governments used public works as

a means to offer employment to those rendered destitute and hungry during famines (Torry 1986). The Indian government today implements a variety of social assistance initiatives to address the poverty and vulnerability of the large number of marginal and disadvantaged households in the country. Perhaps the best known and certainly the largest in scale and scope is the MGNREGS, launched in February 2006. The program guarantees 100 days of unskilled wage labor employment to all Indian households whose adult members are willing to work. Verified households are entitled to receive work close to their village. Women receive priority with a minimum of 33% of those receiving employment and receive equal wages to the men – effectively setting a minimum wage and transforming employment norms. More than 261 million individuals in 130 million households are registered in the program (MGNREGS Portal 2019). The program supports more than 2.5 billion person days of employment annually, estimated to constitute about 2.5% of total rural employment in India.

In addition to guaranteed employment, MGNREGS has three other components: Infrastructure creation, skills development, and institutional strengthening. Those who are employed in the program work on local infrastructure creation. Infrastructure products can be classified into three types. These include: natural resource management infrastructure (eg., small dams, ponds, and trenches); land development and agricultural infrastructure (plantations, irrigation channels, livestock and fisheries, and water and grain storage); and other infrastructure (roads, footpaths, sanitation, and community buildings). The program has created more than 46 million million infrastructure assets. Through its skills development efforts, the program seeks to enhance the range of tasks rural residents can perform. The program has also attempted to increase the capacity of rural institutions such as village panchayats or councils to make informed decisions for selection of infrastructure projects.

A growing literature highlights the ecosystem and environmental impacts of MGNREGS (Kumar 2015, Sebastian and Azeez 2014, Tiwari et al 2011). According the Government of India, 8.9 million public and private infrastructure works were completed through under MGNREGS in 2018: of these, approximately 1.3 million focused on natural capital improvements through projects for soil and water conservation, ground water recharge, drainage improvement, and tree plantations (MGNREGS portal 2019). A persistent criticism of MGNREGS-supported asset development is their quality. But there is at least some evidence from independent studies that MGNREGS users find MGNREGS assets to be

useful and of adequate quality or higher (Bhaskar et al. 2016, Giribabu et al. 2019, Ranaware et al. 2015).

These aspects of the MGNREGS, despite criticisms about its politics (Das and Maiorano 2019), are clearly responsive to urgent ecosystem and climate change related challenges that India faces. For example, India's Green India Mission seeks to meet the country's goal to bring a third of its area under forest cover. It seeks to bring 5M Ha under trees and additionally improve the quality of forests and land cover for another 5M Ha. Afforestation and ecosystem restoration with diverse species are a central element of India's emissions reductions goals. At the same time, these nature-based solutions also aim to increase the adaptive capacity of India's poor by focusing on ecosystems that can provide material benefits to people without undue exploitation.

There is clearly variability in MGNREGS outcomes across India depending on the local capability to design and place assets and the timing of demand for labor in relation to the timing for asset development. But the large body of program evaluations for MGNREGS paints a generally positive picture when it comes to improvements in wellbeing and nutrition, poverty reduction, increased wage rates, and positive health, educational, and environmental effects (Ehmke 2016, Narayanan and Gerber 2017). With an outlay of more than 7 billion dollars annually, the program has also made a major impact on rural incomes, both directly and by raising the wage rates of unskilled and skilled labor, and has contributed to household resilience (Godfrey-Wood and Flower 2018). In states where there has been significant investment in technical skills for local government in watershed approaches, MGNREGS appear to provide better outcomes (Reddy 2012).

India is seeking to ensure convergence between MGNREGS and their climate missions – with MGNREGS providing the labor and the climate missions providing technical expertise and budget for materials. Some of the potential strategies under consideration or already being implemented include consideration of climate risks and natural resource management in the selection, design and maintenance of rural infrastructure; expansion of employment to 150 days during periods of droughts, the use of climate vulnerability mapping tools; and the use of new technologies such as drones, geo-spatial mapping, and social audits to improve the quality of infrastructure assets. Other strategies include efforts to develop greater convergence between MGNREGS and related policies for solid waste management, Rural Energy Guarantees, and Missions for livelihoods and tree planting. Convergence with these efforts holds the promise of more climate-resilient and lower-carbon pathways out of poverty (Kaur et al 2019). At the same time, the government may

need to invest additional resources to meet the goals of greater climate resilience through its flagship public works program.

### 3.2 Productive Safety Net Program, Ethiopia

The main motivation for Ethiopia's Productive Safety Net Program was to alleviate food insecurity. The Government of Ethiopia launched the PSNP in 2005. The program replaced earlier near-annual appeals by the government for emergency food aid and sought - with help from donors - to provide food to chronically food deficit households in food deficit areas so as to prevent loss of household assets and enable the creation of community assets (Berhane et al. 2014). The goal of the PSNP was to relieve chronic food insecurity for recipients by enabling them not to rely on emergency food aid. To do so, the program provides employment on public works projects to food insecure households that have able-bodied individuals. The program supports households that do not have adult able-bodied individuals through transfers that do not require household member to work. The number of days of employment varies depending on availability of financial resources. Communities are involved in choosing who takes part in the program, as well as the selecting the types of activities promoted by the project.

From the very beginning, the PSNP has been implemented at scale. The number of people covered by the program rose from 5 million in 2005 to 8 million in 2006 (Bene et al. 2012). The government together with donors committed an annual budget of US\$ 500M to the program in an effort to make a major difference in prevailing levels of food insecurity. Similar to other employment schemes, the PSNP also attempted to increase the level of asset holdings for beneficiary families through an explicit link to improvements in agricultural productivity through its Household Asset Building Program (HABP) from 2009 (Berhane et al. 2014).

The PSNP is estimated to create roughly 40,000 community level assets annually. Selection of community level projects and asset development under the PSNP follows a set of seven criteria. Assets should be productive, labor based, gender sensitive, predictably scheduled, close to beneficiaries, and integrated into local development plans. In addition, they should support community participation, provide benefits to the community, and follow a watershed approach. Assessments of the programme highlight its evident social and climate adaptation contributions (World Bank 2013a). But many of the projects under the PSNP have also supported land restoration, replenished soil fertility, improved water

management, and expanded irrigated area – in short, providing a whole range of ecosystem services that were in danger of being lost (Adimassu and Kessler 2015, Subbarao et al. 2012).

Although most assessments of the PSNP focus on human wellbeing outcomes, a number of studies have tried to identify its environmental impacts as well. In an early study of Food for Work Programs that predated the current PSNP, Holden et al. suggest that they supported improvements in ecosystem services through public investments in tree planting and conservation in northern Ethiopia in addition to “crowd(ing) in private investment in soil and water conservation (2006:22).” Two later studies similarly find that PSNP improved tree planting activities among beneficiaries (Andersson et al. 2001) and that households provided labor both through the PSNP and as voluntary uncompensated labor to build community assets for soil and water conservation (Kumasi and Asenso-Okyere 2011). Perhaps the most direct evidence about the contribution of PSNP’s land management to climate goals comes from Woolf et al. who estimate that the program reduced net GHG emissions at the national scale by 3.4 million Mg CO<sub>2e</sub> per year, contributing “1.5% of Ethiopia’s Nationally Determined Contribution to the Paris Agreement” (2018: 1260).

Indeed, Ethiopia’s Nationally Determined Contribution for the Paris Climate agreement focuses in common with that of India on the need to enhance the adaptive capacities of ecosystems, communities, and infrastructure through rehabilitation. It recognizes that such rehabilitation of “degraded ecosystems and lands will also increase the resilience... to droughts and floods.” (UNFCCC 2015b). Ethiopia’s adaptation plan also highlights the potential of nature-based solutions such as agroforestry, sustainable afforestation, and biodiversity corridors for improving the incomes and material wellbeing of poor and vulnerable peoples.

### 3.3 Temporary Employment Program (PET), Mexico

Mexico’s temporary Employment Program is an important example of a labor focused program that has sought to couple a government’s response to climate or environmental disasters with social assistance. The key element of the program is to support households on public works programs for infrastructure or for environmental and sustainable agricultural development (World Bank 2013b) in an effort to reduce exposure to disasters that cost Mexico more than US\$1.0 billion annually.

The origins of PET can be traced to the Special Employment Program launched by the Government of Mexico in 1995. In this early version, the focus of the program’s employment provision was mainly on development of infrastructure through labor-intensive

projects. The Ministry of Social Development was in charge of implementation. But the repeated exposure of a large part of Mexico's population to different kinds of disasters, including droughts, cyclones, storms, and high intensity rainfall events contributed to the program's evolution towards collaboration with other ministries. Initially, the new partners for the program were the Ministry of Agriculture and Rural Development and the Ministry of Natural Resources and Environment. Program implementation is now collaborative with the Ministries of Labor and Communications.

As part of its evolution, PET developed a new component focused on emergency support during disasters to households and areas affected directly by such disasters. With a relatively low level of investment of around 5 million dollars annually, this component is adequate to cover only small losses households incur. It will require higher levels of investment to help households cope with substantial losses and the impacts of larger disasters. The main focus of PET is on employment directed towards health, education, nutrition, and climate adaptation at the household level (Radel 2012), and environmental conservation, roads, historic preservation and infrastructure improvement at the community level.

Key design features of PET include targeting towards poorer and more vulnerable households within municipalities that are more exposed to disasters such as droughts and high rainfall events. Beneficiaries, who receive wages equaling 99% of the minimum wage rate, are expected to register with PET (Galhardi 2009). Disbursements of earned income occur within a week of work having been carried out. Data on program implementation is collected and managed through an electronic database, with particular attention to grievances and accountability. Program evaluation is mainly available in the form of feedback by beneficiaries which tend to be high – but external evaluations have not yet been carried out. As a result, only limited generalizations can be made about the effectiveness of PET, especially when compared with Mexico's flagship *Oportunidades* program and despite the fact that PET is the largest employment scheme in Latin America.

In some contrast to the examples of India and Ethiopia, the relationship between Mexico's PET and natural capital outcomes is less clear. For example, Mexico has committed in its National Determined Contribution to the UNFCCC that it will bring deforestation down to 0% by 2030, reforest watersheds, guarantee food security through integrated watershed management, conserve and restore ecosystems, and increase carbon capture through a system of conservation and recovery of marine ecosystems. Despite their strong payments for ecosystems services program (Cortina and Porras, 2018; Kato-Huertas 2018), it is unclear

how funding, resources and actions will be scaled to the level needed to meet these ecosystem goals. In this context, public works and employment guarantees provide an attractive avenue to meet simultaneously the social goals of reducing vulnerability and the ecosystem goals of restoration and carbon sequestration.

There is some evidence that the Temporary Employment Program has been used in protected areas to support rural livelihoods and undertake tree planting and maintenance (Santana-Medina et al. 2013). But on the whole, information on impacts of PET, particularly its natural capital effects, remains limited (World Bank 2013b). Several lessons still emerge from its experience. Careful coordination across ministries, integration of disaster risk management in the provision of employment benefits and infrastructure, a focus on conservation and climate adaptation instruments, local assets to support greater resilience, and a database on beneficiary registration and program implementation are important design features that could be deployed to help structure the provision of employment more effectively towards ecosystem and environmental benefits.

### 3.4 Comparing Employment Schemes in India, Ethiopia, and Mexico

The brief review of the three large-scale employment schemes reveals a number of common threads across their origins and implementation. Equally, the comparison highlights some lessons they offer about the role of social assistance in supporting improved environmental outcomes (See table 3 below).

All three programs were born out of a concern to support citizens affected adversely by different kinds of environmental disasters. MGNREGS in India and the PSNP in Ethiopia were a direct response to experiences of famines and food insecurity – especially for the most vulnerable. Mexico’s PET aims to support households negatively impacted by disasters more broadly, including cyclones, storms, and high rainfall.

With their roots in environmental threats to livelihoods and food security, each of these three programs also exemplifies efforts to conjoin the goal of reducing social vulnerability with the goal of improving natural capital and ecosystem services. All three employ labor to manage and improve the utilization of land and water resources. They aim to support the creation of infrastructure that would guard against soil erosion. They dedicate resources to improving land cover. And importantly, each of the three is making serious efforts to improve coordination across government ministries and departments to reduce the probability of working at cross purposes and improve program outcomes by strengthening technical support during implementation.

The three programs dedicate different levels of resources and are heterogeneously attentive to improvement of institutional capacities at the local level. While MGNREGs in India explicitly states institutional strengthening at the local level as one of its four major goals, PSNP and PET have invested less in doing so.

Table 3: Comparison of the employment schemes in India, Ethiopia, and Mexico

	India (MGNREGS)	Ethiopia (PSNP)	Mexico (PET)
Origins	Disaster relief	Disaster relief	Disaster relief
Resource allocation	Substantial (> US\$7B)	Medium (> US\$500M)	Low (<10M)
Institutional coordination	Across multiple agencies	Limited	Limited
Attention to ecosystem goals	High	Medium	Low
Outcomes	Ecosystem and natural capital: documented improvements Emissions: Positive but no reliable estimates	Ecosystem and natural capital: Documented improvements Emissions: ~2.5% of Ethiopia's NDCs	Unclear

As a large body of work on the role of local institutions and governance has pointed out, greater local capacity to manage natural resources held in common – from water bodies to grazing areas, woodlots, and forests – has the potential to yield substantial improvements in the provision of ecosystem services and in the sustainability of their utilization (Ostrom 1990, Oldekop et al. 2019). Social assistance programs focusing on employment and public works creation offer a fruitful avenue to explore such possibilities. But to take advantage of local, user-group based organizations in supporting natural capital based solutions, it is also clear that employment schemes must invest in strengthening their fiscal and institutional capacity.

#### 4. The Challenges and Promise of Employment Schemes for Ecosystem Stewardship and Building Climate Resilience



This paper suggests that employment based social assistance programs – have the potential to restore and protect ecological integrity at relatively large scales. This is because employment schemes are politically attractive and hence sustainable at scale in many contexts. At the same time it is clear that the quality of implementation in many existing employment schemes is weak. Some of the weaknesses include limited provision of labor opportunities in comparison to demand, seasonal variations in demand for employment to which governments are inadequately responsive, insufficient transfers through wages compared to nutritional and basic needs of recipient households, and leakages and corruption because of which funds spent on the programs do not find their intended households but instead end up with rural or administrative elite. Some of these weaknesses can be addressed with greater accountability, improved fiscal capacity, and better implementation.

But when it comes to the environmental outcomes of employment schemes, two challenges need particular attention for sustainable and equitable ecosystem stewardship. Firstly, the poor design and maintenance of local public works outputs in many schemes and secondly the concern that social assistance schemes will be overburdened with additional objectives.

The poor quality of assets generated by public works schemes is a consistent theme in the literature (McCord 2012, ODI 2012). Most of the evidence relates to small scale infrastructural works (rural roads, construction of local public facilities such as clinics), rather than environmental assets. Reasons include problems of scale (programming that is over-ambitious for the time, labor and capital that is available), weaknesses of local planning, inability to match inputs other than local labor (skilled labor, machinery, materials etc.) to the time frames needed, and inadequate attention to the ownership of the asset created and therefore responsibility for maintenance. The weaknesses of planning and organization that characterize local infrastructural work likely also apply to investments in environmental assets. Woodlots are a common output from public works schemes in Africa, for example. They tend to involve single species and hence have low resilience to climate change impacts. Also they often are intended to supply either fuel or construction materials rather than the providing a broader set of valuable ecosystem services. In addition, they have often been implemented without due concern to the economics of the enterprise, or to issues of ownership and benefit distribution (Harm and Theron 2010).

Issues of achieving functional complementarity between social and environmental objectives are complex and challenging. At the institutional level social welfare ministries

often charged with running social assistance programs are generally not equipped with the technical expertise necessary to identify appropriate projects with environmental goals (Porras and Asquith 2018). There may also be significant tradeoffs between social and environmental goals. If, for example, the poverty reduction goal is to provide work and income in the dry season in an agricultural area with a unimodal rainfall pattern (when there is a surplus of unused labor), that may not allow for support to be provided to certain kinds of activity essential to the stewardship of the local ecosystem which might be best carried out either in, or shortly after, the rainy season.

The challenge therefore is to develop employment schemes which enable local communities to gain access to information and expertise enabling effective action for stewardship of ecosystems for both social and environmental goals (Kremen and Merenlander 2018). This would involve a step change from the cultural models for local environmental stewardship which have tended to predominate (for example single species woodlots) to approaches which build local institutions that are capable of regular engagement with the range of perspectives of community actors to tackle tradeoffs and prioritize investments that respond holistically to multiple objectives. These holistic responses would seek to reduce poverty and hunger, promote local biodiversity, increase the provision of ecosystem services, strengthen resilience to climate change impacts, and increase and secure carbon storage and sequestration in local landscapes.

## **5. Conclusion**

This Perspective highlights the potential of employment schemes to tackle important elements of the crises of inequality, biodiversity loss and climate change. Available evidence in the case of both the MGNREGS in India and the PSNP in Ethiopia suggests that these programs help reduce social vulnerability by making available wage-based incomes for household wellbeing. At the same time, by channeling labor in infrastructure projects – many of them related to improvements in ecosystems, strengthening of natural capital, and terrestrial sequestration through tree planting and ecosystem restoration—they also have the potential to support the achievement of national environmental and climate goals. In Mexico’s case, although there is some suggestive evidence on the potential of PET, it is both too preliminary and the program is too small to make a difference in environmental outcomes at the national level. At the same time, it is important to acknowledge that at least Mexico is a middle income country, and both India and Ethiopia have enjoyed sustained rates of high economic growth in the recent decades.

546 Creating similar programs in terms of scale and coverage will require both political  
institutionalization and economic investments that may take time to achieve – particularly in  
sub-Saharan Africa.

549 Overall, the available evidence suggests that employment-based schemes, if  
implemented well, have the potential to address both social and environmental challenges  
jointly rather than through the siloed implementation of distinct programs whose objectives  
552 may be viewed as being in conflict. Such schemes can accomplish their conjoint goals by  
unleashing finance at scale for employment alongside technical expertise to ensure sound  
local action and create working landscapes to conserve biodiversity, sequester carbon, and  
555 help communities adapt and thrive in a rapidly changing climate (Seddon et al. 2019b).

But considerable challenges prevent the realization of this potential. It would  
require an evolution of institutional systems for delivering social assistance to enable them  
558 to combine social and environmental objectives more effectively. In doing so they would  
need to work on evolving local cultural models for environmental action away from models  
reflecting technical understandings of the mid-20<sup>th</sup> century (such as exclusionary woodlots  
561 or ecological spaces protected from local communities), towards effective approaches to  
ecosystem stewardship that reflect the scale of current challenges.

Doing so will require multiple approaches to bringing programs with objectives of  
564 poverty reduction, climate change and biodiversity together – either integrating objectives  
into one program and investing in strengthening local technical expertise, or through  
convergence between programs, such that technical expertise and materials is provided  
567 through one program and labor through another. An assessment of the comparative  
benefits of programs that focus individually on social vs ecological and climate goals is  
beyond the scope of this paper. But regardless of whether governments pursue these goals  
570 jointly through social assistance programs, or seek to add to social assistance programmatic  
effectiveness through additional investments in environmental planning and GIS-based  
monitoring, they will need to work with local peoples and institutions. Greater gains can be  
573 secured by strengthening local institutions that blend local or traditional technical  
knowledge with contemporary understanding of ecology and climate to enable agile,  
responsive solutions. Indeed, this is perhaps the biggest prize of all, as it would shape new  
576 cultural models for managing landscapes to address the severity of the triple challenges of  
global inequality, and accelerating climate change and biodiversity loss.

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## References

- 582 Adam, H. N. (2015). Mainstreaming adaptation in India—the Mahatma Gandhi National Rural  
Employment Guarantee Act and climate change. *Climate and Development*, 7(2), 142-152.
- 585 Adato, M., Hoddinott, J., & Haddad, L. J. (2005). *Power, politics, and performance:  
community participation in South African public works programs*. Research Report No. 143).  
International Food Policy Research Institute: Washington DC.
- 588 Adimassu, Z., & Kessler, A. (2015). Impact of the productive safety net program on farmers'  
investments in sustainable land management in the Central Rift Valley of Ethiopia.  
591 *Environmental development*, 16, 54-62.
- 594 Andersson, C., Mekonnen, A., & Stage, J. (2011). Impacts of the Productive Safety Net  
Program in Ethiopia on livestock and tree holdings of rural households. *Journal of  
Development Economics*, 94(1), 119-126.
- 597 Banerjee, K and Saha, P (2010) The NREGA, the Maoists and the developmental woes of the  
Indian State. *Economic and Political Weekly*. 55.
- 600 Barbier, E. B. (2019). How to make the next Green New Deal work. *Nature*, 565, 6-6.
- 603 Barrientos, A., & Hulme, D. (2009). Social protection for the poor and poorest in developing  
countries: reflections on a quiet revolution: commentary. *Oxford Development Studies*,  
37(4), 439-456.
- 606 Bastagli, F., Hagen-Zanker, J., Harman, L., Barca, V., Sturge, G., & Schmidt, T. (2019). The  
impact of cash transfers: A review of the evidence from low-and middle-income countries.  
609 *Journal of Social Policy*, 48(3), 569-594.
- 612 Besley, T., & Coate, S. (1992). Workfare versus welfare: Incentive arguments for work  
requirements in poverty-alleviation programs. *The American Economic Review*, 82(1), 249-  
261.
- 615 Béné, C., Devereux, S., & Sabates-Wheeler, R. (2012). Shocks and social protection in the  
Horn of Africa: Analysis from the Productive Safety Net Programme in Ethiopia. *IDS Working  
Papers*, 2012(395), 1-120.
- 618 Berry, S. (1989). Social institutions and access to resources. *Africa*, 59(1), 41-55.
- 621 Berhane, G., Gilligan, D. O., Hoddinott, J., Kumar, N., & Taffesse, A. S. (2014). Can social  
protection work in Africa? The impact of Ethiopia's productive safety net programme.  
*Economic Development and Cultural Change*, 63(1), 1-26.
- 624 Betcherman, G., Olivas, K., & Dar, A. (2004). Impacts of Active Labor Market Programs: New  
Evidence from Evaluations with Particular Attention to Developing and Transition Countries.  
Social Protection Unit, Human Development Network. Washington DC: World Bank.
- 627 Bhaskar, A., Shah, A., & Gupta, S. (2016). 7.5 crore green jobs? Assessing the greenness of  
MGNREGA work. *The Indian Journal of Labour Economics*, 59(3), 441-461.
- 630

- 633 Binns, J. A., Illgner, P. M., & Nel, E. L. (2001). Water shortage, deforestation and development: South Africa's Working for Water programme. *Land Degradation & Development*, 12(4), 341-355.
- 636 Brouwer, R., Akter, S., Brander, L., & Haque, E. (2007). Socioeconomic vulnerability and adaptation to environmental risk: a case study of climate change and flooding in Bangladesh. *Risk Analysis: An International Journal*, 27(2), 313-326.
- 639 Camacho, A., Conover, E., & Hoyos, A. (2013). Effects of Colombia's social protection system on workers' choice between formal and informal employment. *The World Bank Economic Review*, 28(3), 446-466.
- 642 Card, D., Kluve, J., & Weber, A. (2017). What works? A meta analysis of recent active labor market program evaluations. *Journal of the European Economic Association*, 16(3), 894-931.
- 645 Conning, Jonathan, and Michael Kevane. "Community-based targeting mechanisms for social safety nets: A critical review." *World development* 30.3 (2002): 375-394.
- 648 Cortina, S and Porras, I (2018) Mexico's Payments for Ecosystem Services Programme. International Institute for Environment and Development, London. International Institute for Environment and Development London
- 651 Das, U. (2019). Accuracy of Targeting Under the Rural Employment Guarantee Programme: A Comparison between West Bengal and Rest of India. *Journal of International Development*, 31(2), 182-210.
- 657 Das, U., & Maiorano, D. (2019). Post-clientelistic initiatives in a patronage democracy: The distributive politics of India's MGNREGA. *World Development*, 117, 239-252.
- 660 Devereux, Stephen, and Rachel Sabates-Wheeler. 2004. Transformative social protection. IDS Working Paper 272. Brighton: Institute of Development Studies.
- 663 Ehmke, E. (2016). India's Mahatma Gandhi National Rural Employment Act: Assessing the quality of access and adequacy of benefits in MGNREGS public works. *International Social Security Review*, 69(2), 3-27.
- 666 Eriksen, S. H., & O'brien, K. (2007). Vulnerability, poverty and the need for sustainable adaptation measures. *Climate policy*, 7(4), 337-352.
- 669 Fiszbein, A., & Schady, N. R. (2009). *Conditional cash transfers: reducing present and future poverty*. The World Bank, Washington DC.
- 672 Galhardi, R. 2009. Mexico: Extended temporary employment programme (PETA). ILO Notes on the Crisis. International Labor Organization.
- 675 Giribabu, F., Mohapatra, C., Reddy, C. S. & Prasada Rao, P. V. V. (2019) Holistic correlation of world's largest social safety net and its outcomes with Sustainable Development Goals, International Journal of Sustainable Development & World Ecology, 26:2, 113-128, DOI: 10.1080/13504509.2018.1519492
- 678

- 681 Godfrey-Wood, R., & Flower, B. C. (2018). Does Guaranteed employment promote resilience  
to climate change? The case of India's Mahatma Gandhi National Rural Employment  
684 Guarantee Act (MGNREGA). *Development Policy Review*, 36, O586-O604.
- Harm, C. & Theron J. M. (1999) "Community forestry and woodlot development in South  
687 Africa: the past, present and future" *Southern Africa Forestry Journal* 184.
- Holden, S., Barrett, C. B., & Hagos, F. (2006). Food-for-work for poverty reduction and the  
690 promotion of sustainable land use: can it work?. *Environment and Development Economics*,  
11(1), 15-38.
- IPBES. 2019. Summary for Policymakers of the global assessment report on biodiversity and  
693 ecosystem services. Diaz, S., Settlele, E. Brondizio, E., Ngo HT... Zayas, C. IPBES: Bonn.
- IPCC. 2018. "Summary for Policymakers," in Masson-Delmotte, V., Zhai, P., Pörtner, H.O.,  
696 Roberts, D., Skea, J., Shukla, P.R., Pirani, A., Moufouma-Okia, W., Péan, C., Pidcock, R.,  
Connors, S., Matthews, J.B.R., Chen, Y., Zhou, X., Gomis, M.I., Lonnoy, E., Maycock, T.,  
699 Tignor, M. and Waterfield, T. (eds.) *Global warming of 1.5°C. An IPCC Special Report on the  
impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse  
gas emission pathways, in the context of strengthening the global response to the threat of  
climate change, sustainable development, and efforts to eradicate poverty*. Geneva,  
702 Switzerland: World Meteorological Organization, pp. 1-32.
- ILO (International Labor Organization). 2017. World Social Protection Report 2017–19:  
705 Universal social protection to achieve the Sustainable Development Goals. International  
Labour Office, Geneva.
- Kato Huerta, J. 2017. *Social inclusion in Payments for Ecosystem Services in Mexico: is it  
708 possible and should we do it?* , Dissertation. *School of Geosciences*, University of Edinburgh:  
Edinburgh, UK
- 711 Kaur, N. Agrawal, A. Barnwal, A., Kumar, N., Manuel, C., Norton, A., Pan, A., Shakya, S., Stein,  
D., Soanes, M., Ven, V. 2019. Building Resilience to Climate Change. IIED Working Paper.  
714 London.
- Kremen C, and Merenlander A.M. (2018). Landscapes that work for biodiversity and people.  
717 *Science* 362(6412): eaau6020.
- Kluve, J., Puerto, S., Robalino, D., Romero, J. M., Rother, F., Stöterau, J., Weidenkaff, F., &  
720 Witte, M. (2019). Do youth employment programs improve labor market outcomes? A  
quantitative review. *World Development*, 114, 237-253.
- 723 Kumar, N. (2015). Exploring the potential of mgnrega for the revitalization of rainfed  
agriculture in India. *International Journal of Agricultural Science and Research (IJASR)*, 5(1),  
59-66.
- 726 Kumasi, T. C., & Asenso-Okyere, K. (2011). Responding to land degradation in the highlands  
of Tigray, Northern Ethiopia. *International Food Policy Research Institute*, 1142, 44.
- 729 Kuriakose, A. T., Heltberg, R., Wiseman, W., Costella, C., Cipryk, R., & Cornelius, S. (2013).  
Climate-responsive social protection. *Development Policy Review*, 31(S2), o19-o34.

- 732 Lagarde, M., Haines, A., & Palmer, N. (2007). Conditional cash transfers for improving uptake  
of health interventions in low-and middle-income countries: a systematic review. *Jama*,  
735 298(16), 1900-1910.
- 738 Mackintosh, F., & Blomquist, J. (2003). Systemic shocks and social protection: The role and  
effectiveness of public works programs.
- 741 McCord, Anna (2012) *The politics of social protection: Why are public works programmes so  
popular with governments and donors?* Background Note. Overseas Development Institute.
- 744 MGNREGA Division (2017) Mahatma Gandhi National Rural Employment Guarantee Act  
2005: Performance, initiatives and strategies (FY15-15 & FY16-17). Ministry of Rural  
Development, Government of India, Delhi.
- 747 MGNREGA Portal. 2019. The Mahatma Gandhi National Rural Employment Guarantee Act,  
2005: Ministry of Rural Development, Government of India.  
[https://www.nrega.nic.in/netnrega/mgnrega\\_new/Nrega\\_home.aspx](https://www.nrega.nic.in/netnrega/mgnrega_new/Nrega_home.aspx)
- 750 Marais, C. and Mlilo, L. 2018. South Africa's Expanded Public Works Programme.  
International Institute for Environment and Development London.
- 753 Narayanan, S., & Gerber, N. (2017). Social safety nets for food and nutrition security in India.  
*Global food security*, 15, 65-76.
- 756 Nersisyan, Y. and Wray L.R. 2019. How to pay for the Green New Deal. WP 931, Levy  
Economics Institute of Bard College, New York.
- 759 Norton, A., Conway, T., & Foster, M. (2001). *Social protection concepts and approaches:  
Implications for policy and practice in international development*. London: Overseas  
762 Development Institute.
- 765 Oldekop, J. A., Sims, K. R., Karna, B. K., Whittingham, M. J., & Agrawal, A. (2019). Reductions  
in deforestation and poverty from decentralized forest management in Nepal. *Nature  
Sustainability* 2: 4231-28.
- 768 Ostrom, E. 1990. *Governing the commons*. Cambridge university press.
- 771 Overseas Development Institute (2012) *Appraising Productivity enhancing Public Works  
Programmes: Social Protection Toolsheet*. London: Overseas Development Institute
- 774 Porras, I., Steele, P., and Mohammed, E.Y. (2016) *Upscaling solutions: The role of conditional  
transfers for poverty reduction and ecosystem management*. International Institute for  
Environment and Development: London
- 777 Porras I, and Asquith N (2018) "Scaling-up conditional transfers for environmental  
protections and poverty alleviation." In Schreckenberg K, Mace G, Poudyal M, *Ecosystem  
services and poverty alleviation: Trade-offs and governance*. Routledge
- 780 Porras, I and Kaur, N (2018) *India's Mahatma Gandhi Guaranteed Employment programme*.  
International Institute for Environment and Development, London.

- 783 Radel, C. A. (2012). Outcomes of conservation alliances with women's community-based  
organizations in Southern Mexico. *Society & Natural Resources*, 25(1), 52-70.
- 786 Ranaware, K., Das, U., Kulkarni, A., & Narayanan, S. (2015). MGNREGA Works and their  
impacts. *Economic & Political Weekly*, 50(13), 53-61.
- 789 Rawlings, L. B., & Rubio, G. M. (2005). Evaluating the impact of conditional cash transfer  
programs. *The World Bank Research Observer*, 20(1), 29-55.
- 792 Reddy, V. R. (2012). Environment and employment in rural India: Moving towards "win-win  
strategies. *Indian Journal of Labour Economics*, 55(1).
- 795 Roe, D., Seddon N, Elliott, J, (2019) *Biodiversity Loss is a Development Issue: A Rapid Review  
of the Evidence*. Issue Paper, International Institute for Environment and Development  
(IIED), London
- 798 Sadoulet, E., De Janvry, A., & Davis, B. (2001). Cash transfer programs with income  
multipliers: PROCAMPO in Mexico. *World development*, 29(6), 1043-1056.
- 801 Santana-Medina, N., Franco-Maass, S., Sánchez-Vera, E., Imbernon, J., & Nava-Bernal, G.  
(2013). Participatory generation of sustainability indicators in a natural protected area of  
Mexico. *Ecological Indicators*, 25, 1-9.
- 804 Scheer, Jessica, and Nora Groce. "Impairment as a human constant: Cross-cultural and  
historical perspectives on variation." *Journal of Social Issues* 44.1 (1988): 23-37.
- 807 Schultz, T. P. (2004). School subsidies for the poor: evaluating the Mexican Progresa poverty  
program. *Journal of development Economics*, 74(1), 199-250.
- 810 Schwan, S., & Yu, X. (2018). Social protection as a strategy to address climate-induced  
migration. *International Journal of Climate Change Strategies and Management*, 10(1), 43-  
64.
- 813 Sebastian, M. K., & Azeez, P. A. (2014). MGNREGA and biodiversity conservation. *Economic  
and Political Weekly*, 49(10), 16-19.
- 816 Seddon N, Daniels E, Davis R, Harris R, Hou-Jones X, Huq S, Kapos V, Mace GM, Rizvi AR, Reid  
H, Roe D, Wicander, S (2019a) Global recognition of nature-based solutions to climate  
change impacts. *Global Sustainability (in press)*
- 819 Seddon N, Chausson A, Berry P, Girardin C, Smith A, Turner B (2019b) Understanding the  
value and limits of nature-based solutions to climate change and other global challenges.  
*Phil. Trans. B. (this volume)*
- 822 Shah, M (2016) Should India do away with the MGNREGA? *The Indian Journal of Labour  
Economics*. 59, 125-153.
- 825 Soares, F. V., Ribas, R. P., & Osório, R. G. (2010). Evaluating the impact of Brazil's Bolsa  
Familia: Cash transfer programs in comparative perspective. *Latin American Research  
Review*, 173-190.
- 828
- 831



834 Subbarao, K. (1997). Public works as an anti-poverty program: An overview of cross-country  
 837 experience. *American journal of agricultural economics*, 79(2), 678-683.

840 Subbarao, K., Del Ninno, C., Andrews, C., & Rodríguez-Alas, C. (2012). *Public works as a  
 843 safety net: design, evidence, and implementation*. The World Bank.

Tiwari, R., Somashekhar, H. I., Parama, V. R., Murthy, I. K., Kumar, M. M., Kumar, B. M., ... &  
 Sengupta, A. (2011). MGNREGA for environmental service enhancement and vulnerability  
 843 reduction: rapid appraisal in Chitradurga district, Karnataka. *Economic and political weekly*,  
 46(20), 39-47.

846 Torry, W. I. 1986. Drought and the government-village emergency food distribution system  
 in India. *Human Organization*, 11-23.

849 Turpie, J. K., Marais, C., & Blignaut, J. N. (2008). The working for water programme:  
 Evolution of a payments for ecosystem services mechanism that addresses both poverty and  
 ecosystem service delivery in South Africa. *Ecological economics*, 65(4), 788-798.

852 UNFCCC. 2015a. Intended Nationally Determined Contribution, Ethiopia. Bonn.

855 UNFCCC. 2015b. Intended Nationally Determined Contribution, India. Bonn.

858 UNFCCC. 2015c. Intended Nationally Determined Contribution, Mexico. Bonn.

Waldron, A., Mooers, AO., Miller, DC., Nibbelink, N., Redding, D., Kuhn, TS., Roberts, JT., and  
 Gittleman JT. 2013. Targeting global conservation funding to limit immediate biodiversity  
 861 declines. *Proceedings of the National Academy of Sciences* 110, no. 29: 12144-12148.

864 Woolf, D., Solomon, D., & Lehmann, J. (2018). Land restoration in food security programmes:  
 synergies with climate change mitigation. *Climate policy*, 18(10), 1260-1270.

867 World Bank. (2013a). Mexico's Temporary Employment Program (PET). Washington DC:  
 World Bank.

870 World Bank. (2013b). Coping with change: How Ethiopia's PSNP and HABP are building  
 resilience to climate change. Washington, DC: The World Bank

873 World Bank. (2015). The State of Social Safety Nets, 2015. World Bank, Washington DC.

876 World Bank. (2018). *The State of Social Safety Nets 2018*. World Bank, Washington DC.  
 doi:10.1596/978-1-4648-1254-5.

879 World Bank. (2019). GDP. <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD>. Accessed  
 on March 1, 2019.

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## Notes

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<sup>1</sup> “Recognising the Duty of the Federal Government to Create a Green New Deal” February 9<sup>th</sup> 2019 Resolution to the 1<sup>st</sup> Session of the 116<sup>th</sup> Congress (House of Representatives) <https://ocasio-cortez.house.gov/sites/ocasio-cortez.house.gov/files/Resolution%20on%20a%20Green%20New%20Deal.pdf>