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SET-BACKS AND SURPRISES

The Challenges of Alleviating Poverty through Ecological Restoration: Insights from South Africa's "Working for Water" Program

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Abstract

Public works programs have been posited as win–win solutions for achieving societal goals for ecological restoration and poverty alleviation. However, little is documented regarding the challenges of implementing such projects. A commonly cited example is South Africa's invasive alien plant control program "Working for Water" (WfW), which aims to create employment via restoring landscapes invaded with alien plants. Recent studies have raised questions over the effectiveness of this program in achieving both its restoration and poverty alleviation goals. This is the first study that we are aware of that synthesizes the knowledge of managers on both the poverty alleviation and environmental outcomes of a public works project. Herein, we sought to understand the challenges and constraints faced by 23 WfW managers in fulfilling the program's environmental and poverty alleviation objectives. We found that the challenges most frequently cited by managers related to the capacity and competence of managers and teams, followed by challenges relating to planning and coordination, specifically the challenges of being flexible and adaptive when constrained by operating procedures. In addition, the current focus on maximizing short-term employment was perceived by some as limiting the efficiency and long-term effectiveness of the WfW program in achieving its environmental and social goals. We suggest that improving the conditions and duration of employment could improve the effectiveness of invasive alien plant control and ecological outcomes. We also suggest that WfW measure the impacts of their interventions through an adaptive management approach so that it can learn and adapt to the challenges it faces.

Key words: adaptive management, ecological intervention, effectiveness, failure, lessons, organizational design, pest control, set-backs.

Introduction

A substantial body of research in restoration and conservation has examined how to design and implement interventions but little research examines the detail of these activities on the ground, for example how an organization's structure and design shapes the effectiveness of its interventions. This is problematic because it could lead to theory that is removed from the practice of applied ecology (Milner-Gulland et al. 2012).

Public works are government job-creation programs that use labor to build or restore public infrastructure, for example, roads, hospitals, and in some cases, ecological infrastructure such as degraded land. They have been used for centuries throughout the world, and today are used by many governments and supported by large donors such as the World Bank (Subbarao et al. 1997; Ninno et al. 2009). Regarding ecological restoration, they have been posited as a possible win–win strategy for alleviating poverty while simultaneously restoring ecological infrastructure (Woodworth 2006; Koenig 2009). For ecological restoration, which has been criticized for overlooking developmental concerns (Aronson et al. 2006, 2010), public works provides an opportunity to address this shortcoming, particularly in the developing world.

Why are public works popular? Other than their win–win appeal, funders are attracted by the cash in-kind arrangement whereby the poor work for their income instead of a conventional unemployment grant (Lieuw-Kie-Song 2009). A second reason is that these programs have the potential to solve the difficult challenge of ensuring that the poorest benefit. By setting the wage at or below the minimum wage it will only attract

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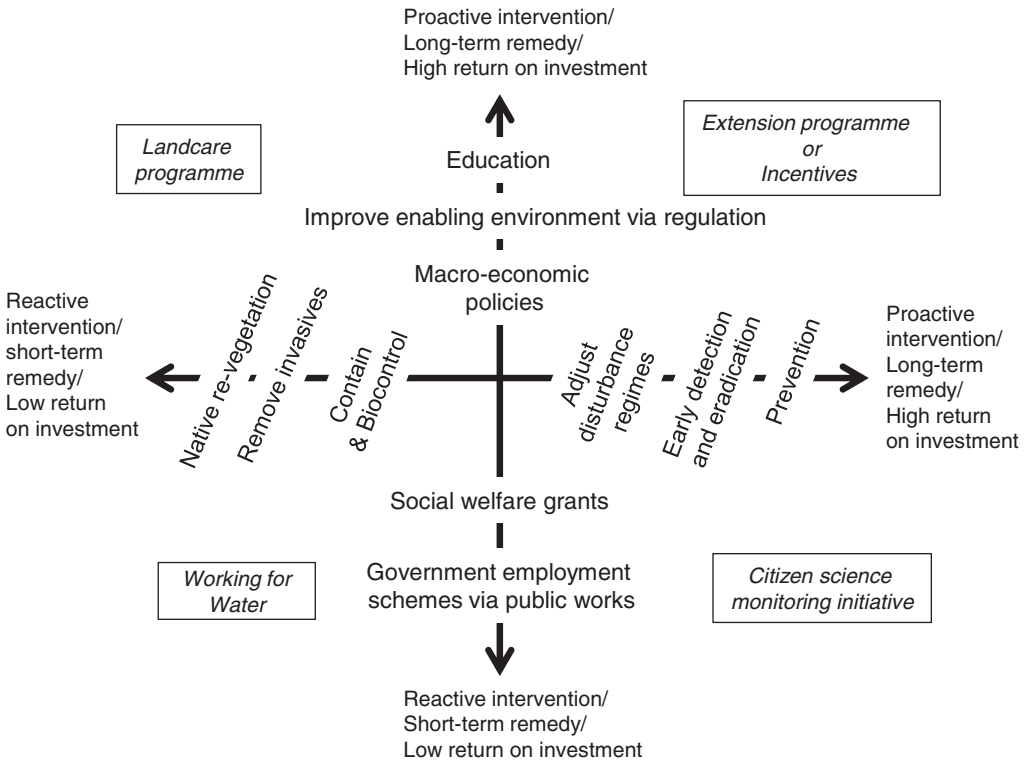

Figure 1. The *y*-axis of the diagram shows the intervention options available to the South African government in addressing poverty alleviation and unemployment. The *x*-axis shows intervention options for reducing the impact of invasive alien plants on biodiversity and ecosystem services. The interventions are scaled from reactive to proactive measures. Because the primary concern of the South African government is alleviating poverty and unemployment, the only overlap with invasive plant control objectives is in the reactive—labor intensive—interventions such as WfW's clearing of invasive alien plants.

unemployed poor and not people who already have employment in the formal market (Lieuw-Kie-Song 2009). Third, public works have strong political appeal because, unlike longer-term remedies that treat the cause of labor market failure (such as education, regulation, and macro-economic policy adjustments), they provide immediate relief which also helps build the impression that the government is taking immediate action to reduce unemployment (McCord 2007). Furthermore, this could arguably help to decrease social unrest where high inequality and unemployment are prevalent.

A commonly cited example of a public works-driven ecological restoration project is South Africa's invasive alien plant control program, "Working for Water" (WfW) (van Wilgen et al. 1998, Hobbs 2004; Turpie et al. 2008). It forms part of the country's Expanded Public Works Programme (EPWP), which is the primary provider of direct aid for South Africa's enormous working-age unemployed population (Department of Public Works, 2009) (Fig. 1). Established in 2004, the EPWP's ambitious millennium development goal was to halve unemployment by 2015 (McCord 2007).

Within the EPWP, WfW is the largest environmental program and one of the main initiatives providing aid for South Africa's poor, rural population, most of who are unemployed. Partly as a result of these goals and its large annual budget (approximately 67.6 million US dollars in 2011), WfW is lauded as the most ambitious alien plant control program in the world (Koenig 2009). The program's economic argument for clearing alien plants is based on its ability to restore and improve ecosystem services such as surface water runoff and grazing potential (van Wilgen et al. 2008). Despite these ambitious goals, little is known about its effectiveness in reaching these goals (but see McConnachie et al. 2012).

A recent national-scale assessment by van Wilgen et al. (2012*a*) showed that WfW was not on-track to fulfill its goal of reducing the overall impact of plant invasions within a reasonable timeframe. They concluded that since its inception in 1995—and despite an investment of approximately 432 million US dollars—WfW had only treated a relatively small fraction of South Africa's total alien plant cover, and that alien plant cover had actually increased in extent over the life of the program, although arguably at a rate slower than if the WfW program had not been operational.

In evaluating the broader effectiveness of the EPWP in halving unemployment by 2015, McCord (2007) found that the EPWP was only employing about 4% of the unemployed population. Despite employing one million people in 2007, the EPWP focus on providing temporary or part-time employment results in only 200,000 full-time job equivalents—about 4% of the 5 million working-age unemployed people in South Africa. WfW mirrors this pattern: while annually

employing 20,000–30,000 people (Marais & Wannenburgh 2008; Koenig 2009), it provides full-time employment equivalents for only 5,000 people.

Within this context, we sought to understand the drivers of the challenges facing WfW in achieving its goals, and to learn from them. We did this by interviewing WfW managers regarding the challenges they face in fulfilling the program's goals. This is the first study of which we are aware that assesses and synthesizes the knowledge of managers against the literature on both the poverty alleviation and environmental outcomes of a public works project.

Methods

The Study Area

The western portion of the Eastern Cape is characterized by a semi-arid climate with unpredictable year-round rainfall. The area contains portions of the Albany Thicket, Fynbos, Nama-Karoo, and Grassland biomes (Mucina & Rutherford 2006). The Thicket biome forms part of a global biodiversity priority area, the Maputaland-Pondoland-Albany hotspot (Pierce et al. 2005). Invasive alien plants pose a threat to the high levels of biodiversity and scarce water resources (van Wilgen et al. 2008). The province is the second poorest in South Africa (Eastern Cape Provincial Treasury 2011), and public works programs such as WfW are one of the primary sources of government aid for the millions of working-age unemployed.

Working for Water

WfW operates approximately 300 projects in all South Africa's nine provinces. Our case study site, the western region of the Eastern Cape province, had two WfW implementing agents operating in the area, consisting of the Gamtoos Irrigation Board (GIB) and South African National Parks (SANParks). The GIB's sites are located primarily on private land, whereas SANPark's sites are within formally protected areas (i.e. national parks).

In terms of organizational structure, the responsibility of the WfW national and provincial managers is to allocate funds to implementing agents (who carry out the actual work) and to report on ecological restoration and employment outcomes. The implementing agents can be a conservation agency, irrigation board, or municipality. The implementing agent staff include project managers who are responsible for the daily running of projects and report to their respective area manager. The area managers are responsible for overseeing the planning and implementation of projects within a particular region. The work itself is carried out on a monthly contract basis by teams of workers. The project managers allocate contracts that specify an area of alien-invaded land that must be cleared within that month. Each contract is allocated to the team comprising a team leader (contractor) and 10–15 laborers, recruited from the large numbers of unemployed people in the surrounding area. Each project has, on average, five to seven operational clearing teams at any time. Employment for the workers is episodic and until recently they and the contractors were permitted to participate in the program for a maximum of 2 years before having to make way for other unemployed people.

The primary invasive alien plant species targeted by WfW are shrubs and trees of Australian origin such as *Acacia* and *Eucalyptus*, which coppice after felling and fire. The successful control of coppicing woody species requires felling, followed immediately by the careful application of herbicide to the cut stems. This kills the plant and thus prevents coppicing. Numerous and timely follow-up treatments are required to treat both seedlings and coppice re-growth by spraying with herbicide, and is compounded when previous treatments were poorly executed (Holmes et al. 2008). Trees from the genus *Pinus*—indigenous to the Mediterranean Basin and North and Central America—also pose a significant challenge for WfW. The treatment of pines requires felling (no herbicide is required because they do not coppice) followed by burning to kill seedlings (van Wilgen et al. 2011). Of less significance are nonwoody species such as *Lantana camara, Solanum mauritianum, Cestrum jamacaru*, and *Chromolaena odorata* (Marais et al. 2004; Marais & Wannenburgh 2008).

Private landowners are legally obliged to eradicate invasive alien plants under the Conservation of Agricultural Resource Act (1983), and the National Environmental Management: Biodiversity Act (2004). WfW's general policy is that landowners will contribute to part of the cost of initial clearing, and maintain sites free from re-invasion after WfW have completed the first follow-up treatment.

Manager Interviews

In total, we interviewed 23 managers consisting of 10 project-level managers, 3 area managers, 1 provincial manager, 3 WfW consultants, and 6 national managers (based in the WfW national head office). We interviewed approximately 85% of the managers in the western region of the Eastern Cape. We restricted the selection of interviewees in the national office to those who were directly involved in the planning of operations and not administrators who represent the bulk of the national office staff members.

We conducted the interviews face-to-face, over the telephone, and via email depending on the availability of managers. The questions were open-ended and reflected the types of challenges faced by the managers in fulfilling WfW's environmental and poverty alleviation goals. More specifically, we asked them what the reasons were for the manifestation of the challenge, resultant impacts, and possible solutions for overcoming the challenges.

To identify emerging themes from the open-ended responses, we used thematic coding based on the grounded theory approach (Creswell 2009; Birks 2010). To rank the themes, we recorded the number of managers that cited each theme. We then grouped these emerging themes into five broad categories. We also divided the managers into a regional and a national group. The national managers consisted of the six national WfW managers and the one provincial

Table 1. The percentage of the managers who cited challenges falling within each of the five broad categories.

	Regional managers (n = 16)	*National managers (n = 7)*	*Total managers (n = 23)*
Capacity and competence of managers and teams	81	43	70
Capacity and competence of the managers and teams to carry out their responsibilities effectively and efficiently			
Planning and coordination	50	71	57
Adaptability and flexibility of operations; planning with the focus being on short-term job creation and the other objectives not clearly defined; political pressure to operate in some low-priority areas; coordination challenges between different government departments			
Landowner compliance	44	43	39
Enforcement and incentive for landowners to maintain sites treated on their land; landowner type and experience			
Poverty alleviation effectiveness	44	29	39
Selecting the poorest people to work in the program; adequate training so that they can find employment; long-term difference the program makes to their livelihood; WfW only employ a very small fraction of the total unemployed			
Monitoring and evaluation	13	57	26
Related to the monitoring and evaluation of data management, alien plants, implementation performance, landowner compliance, and poverty alleviation outcomes			

Themes within each category are shown in italics.

manager. We classified the remainder of the managers as regional.

Results

The most frequently cited challenges expressed by interviewees related to the capacity and competence of managers and teams, followed by challenges relating to planning and coordination (Table 1).

Capacity and Competence of Managers and Teams

The most commonly cited reasons for poor capacity and competence of managers related to the difficulty of finding, attracting, and retaining managers with suitable education, skills, and experience relevant to invasive plant control management. In addition, the low management to worker ratio, as well as the inflexibility of operations—stemming in part from rigid protocols and recruitment procedures of both managers and teams—were also cited as reasons affecting management effectiveness. With specific reference to the teams, the managers highlighted the lack of team motivation and discipline resulting from inadequate performance incentives, as well as the lack of ethics related to work and environmental concerns. The managers also cited the challenge of working with unskilled workers who had little experience and knowledge of alien plant control. This was because WfW is a public works project and so has to employ the poorest and least skilled workers The impacts of the poor effectiveness of both management and teams was wasted resources, fewer environmental benefits stemming from less effective reduction of alien plant cover, the persistence of workers' poverty after they were released from the program, and manager burnout. Potential solutions included increasing the accountability of operational staff through effective monitoring and evaluation, as well as directly linking worker performance to incentives. All levels of management were highlighted as important, with specific emphasis given to project-level managers. More effective training of staff was also cited, coupled with improved screening when recruiting staff. For the teams this involved more emphasis on selecting well-capacitated contractors. The majority of the regional managers cited challenges relating to this category, whereas only a minority of the national managers emphasized improvements for selecting well-capacitated contractors.

Planning and Coordination

The cited challenges related primarily to the inflexibility of operational procedures which prevented project managers from adapting their plans to unforeseen events or changing circumstances. For example, after unexpected wild fires managers would need to quickly alter their plans by focusing follow-up treatments on burnt areas. Managers also cited the difficulty of planning arising from the focus on short-term job creation and poorly defined goals relating to ecological objectives other than the imperative to create jobs. One manager cited political pressure to operate in areas that were not necessarily priorities for employment or alien control. Managers also cited poor coordination with other state departments (lack of co-governance). The primary reason cited for the general lack of flexibility was attributed to bureaucratic impediments resulting from government's rigid protocols restricting managers

from adapting their plans to unforeseen events or changing circumstances. The overall impacts were wasted resources, and sub-optimal environmental and social outcomes. The managers' proposed solutions to these challenges were for better planning and coordination, and improved monitoring and evaluation. Three managers believed that the EPWP's goal of employing as many people as possible, regardless of the consequences (i.e. lower quality work and limited long-term livelihood improvement), needed to be re-examined.

Landowner Compliance

The main challenge for ensuring the long-term control of invasive alien plants on sites treated by WfW on private land was a lack of incentives and enforcement for landowners to conduct on-going follow-up treatment of sites (as required by law) so that they were not re-invaded. To a lesser degree, general education and awareness, as well as engagement with landowners, were also cited as challenges. The main reasons cited for the lack of enforcement and incentives were legislative failings, and the capacity and willingness of other state departments—most notably the Department of Agriculture, Forestry and Fisheries—to implement enforcement or provide financial incentives for landowners to remove alien plant regrowth. Low landowner compliance has led to WfW resources and interventions being squandered. The recommended solutions were for legislative enforcement to take place and for sufficient capacity to be allocated to this task. Managers also cited improved engagement and use of market incentives for the landowners.

Poverty Alleviation Effectiveness

The two main themes relating to this issue were WfW's imperative to select the poorest and least skilled workers and the inadequacy of training. A further issue linked to the latter challenge was ensuring that the teams received training that would assist them in finding employment beyond the WfW program. One project manager mentioned that WfW was only employing a very small fraction of unemployed people in their region. The main reason cited for poor targeting resulted from selection committees—largely comprised of local community leaders—being influenced by nepotism and political favoritism. With regard to the inadequate quality of training, managers blamed this on the ineffectiveness of the Department of Labour—the chief service provider for worker skills training, as well as the low education level of many of the workers. The consequence of a compromised selection process meant that the most poverty stricken people often did not benefit from the program. In addition, four managers argued that the program made little difference to the long-term livelihood of workers, and one of the managers mentioned that the program could actually worsen their long-term livelihood prospects by diverting them from finding more sustainable long-term income flows. The suggested solutions were for better screening for poverty status and improved skills training by auditing the service providers.

Monitoring and Evaluation

The managers cited as key challenges the inadequate level of monitoring and evaluation of treatments, including the recording of alien plant baselines (accurate quantification of the extent of the problem prior to beginning clearing), enforcing landowner compliance with regard to follow-up maintenance of sites handed over to landowners, and the capacity and motivation to conduct all of the above. The main reasons cited for this had to do with capacity and budget constraints. One of the managers also mentioned the overriding focus of the EPWP on measuring person day inputs and the quantity of beneficiaries, meant that WfW had little time or incentive to monitor other outcomes. In addition, goals are often framed as inputs (e.g. money spent, people employed) rather than outputs (reduction in the extent of invasions, or progress toward a societal goal within a defined timeframe). The impacts were wasted resources as well as knock-on effects such as poor quality treatments and incompetent management, owing partly to poor accountability. Some of the cited solutions included ensuring managers provided assessment reports and were held accountable for achieving outcomes, and increased monitoring and evaluation. One suggestion was for implementing agents to have a performance incentive linked to the monitoring and evaluation of on-the-ground effectiveness. This specific challenge was only cited by two of the consultant managers and none of the permanent managers. Overall, a far greater percentage of national level managers cited challenges relating to monitoring and evaluation compared to regional managers.

Discussion

McCord (2008) argues that one of the core reasons for the challenges faced by South Africa's EPWP results from it being focused on relieving short-term poverty and unemployment through maximizing person days of employment and the number of beneficiaries. Economic theory suggests that this approach can be effective in reviving an economy during a downturn by boosting confidence in the economy and providing temporary employment while an economy recovers. In terms of skills transfer, it can be effective when the training fills skills gaps in the formal economy. This approach, however, is arguably not well suited to the South African context where unemployment is a long-term structural problem. This could have resulted in part from the decline of a labor intensive manufacturing sector and the growth of a service sector which demands highly skilled labor (Kingdon & Knight 2004). Thus the skills gained via working in the public works program might not be of use in gaining a job in the formal economy, where most of the job opportunities are in the skilled service sector. Therefore, without the success of proactive interventions such as education and macroeconomic policies South Africa's EPWP, on its own, might not be the most cost-effective approach to solving South Africa's unemployment problem.

Hope (2006) argued that the skills transfers associated with brief bouts of employment made little difference to WfW worker's long-term competitiveness and marketability. Furthermore, the episodic nature of employment makes it difficult for workers to improve their livelihood strategies, and in some cases could arguably harm their existing strategies by distracting them from searching for more sustainable employment (Aliber 2002; Hope 2006; Buch & Dixon 2009). The program has been criticized for not effectively selecting the poorest and neediest workers (Hope 2006), these concerns were echoed by many of interviewees in our survey.

A further limitation of the focus on short-term employment maximization cited by managers was that it impacted on the capacity and competence of the managers and teams to achieve objectives and efficiently conduct their duties. Managing watershed services effectively is vitally important for securing South Africa's scarce water resources (Blignaut & van Heerden 2009) and hence the growth of its economy. Despite the importance of this, indications are that WfW could be faced with many challenges in achieving this in a cost-effective manner (van Wilgen et al. 2012*a*; McConnachie et al. 2012). For example, McConnachie et al. (2012) showed that a relatively small fraction of WfW's total costs were being spent on wages in two of its projects in the Eastern Cape. Therefore, even when wages are considered a social benefit, WfW arguably still would not be cost-effective in the projects. The above is exacerbated by WfW's (and arguably the broader EPWP's) inability to evaluate the impacts of their interventions, for example, the change in alien plant cover and reduction in poverty (Levendal et al. 2008). This makes it difficult for the program to learn and adapt to the challenges it faces.

How might WfW improve its effectiveness in simultaneously striving to restore ecosystems and alleviate poverty? First, clear quantifiable objectives could be set and then monitored and evaluated in an adaptive management framework (Levendal et al. 2008; van Wilgen et al. 2012b). Second, focusing on selecting, training and maintaining workers in the long-term instead of short-term employment could potentially improve the effectiveness of the invasive alien plant clearing. McCord (2007) recommends focusing on long-term sustained employment (such as India's Employment Guarantee public works program), providing higher wages, and adopting independent measures to select workers. This could partly address one of the most commonly cited challenges faced by the managers namely, the capacity and competence of the teams. Third, as cited by the managers, WfW's difficulties to incentivize or enforce landowners to maintain their land after WfW have treated it results in wasted expenditure. Fourth, in terms of invasive plant control, WfW might benefit from putting greater focus on proactive interventions. For example, de Lange and van Wilgen (2010) supported the focus of employment and manual clearing, but argued that a larger proportion of funding should go to biological control. In addition, cost-effectiveness could be improved by targeting incipient invasions (Higgins et al. 2000). Finally, greater attention could be given to understanding the negative impact that clearing alien plants has on the poor's livelihood, by depriving them of fuelwood and building timber (Shackleton et al. 2007).

In conclusion, public works have the potential to play a vital role in improving access to ecological goods and services, addressing labor market failure, and easing the plight of the unemployed. Little is documented regarding the challenges of implementing such projects. This study highlighted some of the potential challenges as well as solutions to these challenges. However, it is important to note that the challenges and solutions described in this article are untested. Future research and practice could therefore benefit from measuring the impact of public works projects such as WfW and testing different solutions in an adaptive management framework based on empirical evidence (Sutherland et al. 2004; Ferraro & Pattanayak 2006).

Implications for Practice

- Public works programs have the potential to raise funds for ecological restoration, particularly in the developing world where job creation is a focus.
- Maximizing short-term employment at the expense of other objectives could substantially compromise outcomes for people and the environment.
- With regard to the effectiveness of poverty alleviation through ecological restoration, it is important that public works programs be carefully designed for the context and challenges presented by specific unemployment problems.
- Improving the work conditions, incentives, and duration of employment might improve the effectiveness of invasive alien plant eradication and ecological outcomes.

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