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The impact of earned and windfall cash transfers on livelihoods and conservation in Sierra Leone

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Social protection

3ie International Initiative for Impact Evaluation

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About this report

The impact of earned and windfall transfers on livelihoods and conservation in Sierra Leone

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Acknowledgment

Summary

This study uses a randomized controlled trial (RCT) in Sierra Leone to measure the impact of a transfer program aimed at alleviating poverty and reducing pressure on the natural environment. In Sierra Leone, there is currently limited micro-level empirical evidence on unintended social impacts of aid and, in particular, the differential social effects of conditional versus unconditional aid. To this end, we implemented three versions of a transfer program in 91 rural communities in Sierra Leone, which were dependent on slash and burn agriculture. One version provides aid as a windfall transfer to the household, the second allows the chief to distribute the aid as he sees fit within the community, and the third is run as an aid-for-work program that makes household transfers conditional on supplying labor. We compare outcomes across a range of social, economic and land-use indicators.

We find that the way in which aid is distributed—communal versus individual and windfall versus earned—has a significant effect on how the aid will be used. Earned aid given directly to the individual leads to more consumption with little attention given to public goods. Windfall aid given to community leaders leads to more public goods that are better managed. In terms of impact on households' livelihoods and support for conservation, our results are sobering and inconclusive. We find no significant impact on economic, social, and conservation outcomes. This may in part be explained by the high sense of community we find in these villages—over 60 per cent of aid allocated to community projects. Much of the aid being spent on a community project does significantly dampen the potential individual-level impact. In addition, there is also the possibility that the per capita amount of aid (USD 15) may have been too low to impact households significantly. Finally, given the small sample, 91 villages in total, null results may reflect low statistical power rather than a lack of impact on outcomes.

Subsequently, we can only draw limited lessons for policymakers, key influencers, or implementers who need to know about mechanisms and behavioral bottlenecks. If you take our null results at face value, the most cost-effective way to implement a livelihood support program in rural villages is to make unconditional transfers (so that you do not have to spend any resources on monitoring or verification) at the village level (in order to save labor costs by not requiring field staff to visit every household). The organization of the work projects that allowed participants to earn livelihood support took significant time and there is limited evidence it created some ill-will.

These results should be informative to a policymaker who is trying to decide how to implement a livelihood support program. It sheds light on the trade-offs the policymaker must weigh when designing such a program. We hope this research project leads to better understanding and research on the social dimensions of aid dispersion.

Contents

List of figures and tables

Abbreviations and acronyms

AFE   artefactual field experiment

CDF   Community Development Fund

GDP   Gross Domestic ProductFFE framed field experiment

GRNP Gola Rainforest National Park

NGO   Non-governmental Organization

NTFP non-timber forest products

PES   Payment for Ecosystem Services

RCT   randomized control trial

SLL   Sierra Leonean Leone

1. Introduction

Addressing poverty and conservation has become a key challenge worldwide. In recent decades, international organizations and governments have adopted various approaches to reduce poverty in contexts where populations heavily depend on the environment. The most prominent instrument to this end has been conservation payments to local communities (Ferraro 2001, Ferraro and Kiss 2002, Wunder 2007, Milne and Niesten 2009). Such payments are provided in different ways, reflecting both the variation in policy contexts as well as a lack of understanding of the efficiency and cost-effectiveness of different payment modalities.

In fact, there is little evidence on the relative performance of conservation programs (Ferraro and Pattanayak 2006, Pattanayak *et al.* 2010, Miteva *et al.* 2012, Blackman 2012, Cowling 2014, Zheng *et al.* 2013). Evidence from other areas of development policy (e.g., education, healthcare, labor) suggests that transfers are a potentially cost-efficient and effective avenue for promoting policy objectives (see Alesina and Dollar 2000, Kohler and Thornton 2011, Blattman *et al.* 2013, Baird *et al.* 2011, Benhassine *et al.* 2013, Haushofer and Shapiro 2013).

In this project, we seek to evaluate impact of one particular type of conservation aid—the provision of livelihood support to local communities without specific outcome conditions attached to them. Such 'unconditional conservation payments' or transfers can be contrasted with so-called 'payment for ecosystem service' (PES) schemes which, at least in principle, entail conditionality such that payments are only made conditional on specific conservation efforts or outcomes (Ferraro *et al.* 2012, Jack *et al.* 2007). Recent reviews of conservation funding suggest that, in practice, unconditional payments are a significant (and perhaps dominating) conservation-policy mechanism (e.g., Miller 2014; Figaj 2010; Hoeffler and Outram, 2011; Hicks *et al.* 2010), especially to promote conservation outside protected areas (such as in reserve buffer zones).[1]

The aim of unconditional payments typically is to buy support for conservation, relieving pressure on forest lands or buffer zones surrounding protected areas (see below).[2] For example, and in the context of rural Sierra Leone, the aim is to improve habitat connectivity by bringing less forest into the agricultural cycle, or by extending the fallow cycle in shifting agriculture (increasing the amount of 'fallow land' as well as the natural biomass under fallow). The ultimate policy objective is to prevent the

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[1] This reflects the realities of conservation policy implementation, which may preclude the introduction of strict conditionality clauses due to problems with assigning property rights and ownership over resources, problems of enforcement, and especially problems with the political acceptability of strict conditionality requirements. Indeed, many purported PES-type programs in tropical regions are effectively 'unconditional' in the sense that violation of conditionality is often not penalized. Unconditional payment schemes are also sometimes seen as potential precursors to eventual PES-type schemes (Caplow *et al.* 2011).

[2] Several authors look at the poverty environment nexus (see Duraiappah1998) and discuss the potential controversy over what causes what: is poverty a major driver of environmental degradation, or vice versa; and its implications for policy.

creation of isolated nature reserves. Such 'island parks' provide fewer ecosystem services (less wildlife protection etc.) and may represent an unviable and cost-ineffective investment in the long run (e.g., DeFries *et al.* 2005, Gascon *et al.* 2000, Pfeifer *et al.* 2012). However, while perhaps convenient for conservationists and popular among recipients, it is not evident that unconditional payments are an efficient or effective way to promote conservation.

To recipient communities, these transfers often represent a windfall. In addition, when unconditional, these transfers can be unexpected. Such windfall transfers are common in various policy settings and aim to induce behavioral changes either through direct impacts on human welfare (such as their income) or indirectly. Indirect impacts of windfalls often work by alleviating various market and institutional constraints leading people in the developing world to choose second-best labor, land, and capital-allocation decisions. Alternatively, indirect impacts of windfall aid transfers can occur through the impact on people's norms and social conventions (for example, on the impact of the norms of 'sharing'). Yet, the literature has pressing and unaddressed questions concerning the different performance of alternative aid modalities. For example should windfalls be distributed in a centralized or decentralized manner? Also, how do windfall or 'unconditional' transfers compare to aid which is earned or 'conditional'? Windfalls may result in wasteful spending, conflict, rent-seeking and institutional deterioration (Paler 2012, Caselli and Michaels 2013). Alternatively earned income is treated with different mental accounting than unearned income (Arkes *et al.* 1994; Cherry *et al.* 2009; Milkman and Beshears 2009; Christiaensen and Pan 2012). The empirical investigation and microeconomic evidence on the alternative impacts of these various aid modalities constitutes a significant area of research.

This project examines the short-term impacts of a payment scheme on livelihoods and conservation near the Gola Rainforest National Park (GRNP) in eastern Sierra Leone. In this project, the desired conservation outcome is a reduction in deforestation caused by land conversion for agriculture, logging and mining activities.

Sierra Leone has received considerable amounts of aid over the past decades. For example it received USD 24 million in aid from the World Bank in 2012.[3] A simple web search finds hundreds of organizations registered to provide aid in Sierra Leone. Nearly a third of its GDP consists of aid donations. Hence these policy organizations have a particular interest in understanding the different impacts that can be achieved from such aid transfers under alternative design and implementation mechanism.

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[3] Concord Times (Freetown), "Sierra Leone: Govt Gets $24 Million World Bank Budget Support", 01/24/2012. In addition, in 2011 USAID spent USD 30 million (USAID Sierra Leone Fact Sheet FY 2008–2011) and DFID spent GBP 15 million (DFID Sierra Leone Operational Plan 2011–2015).

We focus on evaluating the impacts of a program around the GRNP in Sierra Leone for several reasons. First, the GRNP is part of a world biodiversity hotspot and has received immense conservation interest globally. Second, this particular conservation program is one of the most important of its kind in tropical ecosystems. To our knowledge, this study constitutes the first RCT to analyze the joint impacts of livelihood-conservation payments in the context of tropical deforestation. Previous work has relied on observational data (e.g., see Blackman 2012), which presents clear challenges in formulating the counterfactual (i.e., what would have happened in the absence of the payment scheme). Selection bias introduces a validity threat to identification based on observational data. For example, conservationists may target specific areas (either unspoiled nature, or stretches of land that are "under threat"), or certain communities may be better able to position themselves to benefit from payments. If the ability to benefit from transfers is caused by factors that also matter for conservation or land use (e.g., factors associated with the quality of leadership), then a simple comparison of treated and control villages would imply a biased estimate of the average treatment effect. Instead, when enrollment in a transfer program is based on random assignment, then treatment status is orthogonal to community characteristics.

Our main analysis is based on an RCT combined with detailed survey and behavioral experiments. Specifically, we implemented a survey tracking the use of the aid for consumption, investments, or public goods. In addition, in our community and household survey, we assess impacts on a set of economic, social and conservation indicators. For some outcome indicators we also collected behavioral experimental data. Here we asked respondents to make one or more choices over incentivized alternatives in a lab-in-the-field environment. In addition, during the endline data collection, we implemented a structured activity (or framed field experiment, FFE), where we asked villagers to participate in a scheme setting aside land for non-timber forest product (NTFP) harvesting.

Our research project team collaborated with the NGO managing the GRNP in designing a field experiment in order to evaluate the differential impacts of implementing aid under various modalities. The RCT comprises three ways of distributing conservation aid to local communities: (i) aid distributed to communities through local chiefs, (ii) aid distributed to household directly, and (iii) aid distributed to households conditional on working in a labor program. A fourth group of villages served as our control group. The study was randomly allocated across 91 villages.

Choice of the specific treatments was grounded foremost by economic theory and in particular motivated by our desire to address unanswered questions in the literature. We wanted to compare unearned, unconditional aid (i.e., a windfall) to conditional, earned aid, as well as centralized versus decentralized aid. In addition, the policy organization we were working with also was interested in exploring the relative effects of work-for-aid programs versus free delivery programs and working though chiefs versus households directly.

We find that the way in which aid is distributed—communally versus individually, and whether it is windfall or earned—has a significant effect on how the aid will be used. Conditional aid to the individual leads to more consumption with little attention given to public goods. Unconditional aid to the community leads to more public goods that are better managed.

In terms of impact on households, livelihoods, and support for conservation our results are minimal. For the case of Eastern Sierra Leone, with low population densities and relatively abundant land, our RCT findings suggest that the transfers we tested do not affect economic, social and conservation outcomes.

1.1   Report structure

We discuss the background of the intervention in Section 2. In Section 3 we describe the background and context of the study. Section 4 provides a time line. In Section 5 we describe the experimental design, methods and implementation in detail and in Section 6, we provide detail on how the study was implemented. Section 7 gives our main results on the estimated impacts of the interventions on economic, social, and conservation outcomes. Section 8 provides a discussion of the results and in Section 9, we provide some policy recommendations.

2. Intervention, theoretical motivation, and research hypotheses

2.1   Intervention, key objectives, key activities, and components

The villages in this study lie in the region of the GRNP, in south eastern Sierra Leone. The GRNP is one of the largest and last remnants of the Upper Guinea forest in West Africa. Local populations here, depend largely on agriculture and forest-related goods and services. It is located in one of the poorest regions in the world, torn by a recent civil war (1991–2002). The GRNP is managed by a locally established NGO, the Gola Rainforest National Park Program (GRNPP). As compensation for the limitations imposed on hunting and logging rights within the park boundaries, communities in the vicinity benefited from the Community Development Fund (CDF). These funds aim to finance projects that address community needs. The CDF consists of a one-off grant proportional to the village size.[4] The CDF resembles a windfall to communities who receive them as they are unconditional transfers that are not expected by households.

These CDF transfers aim to promote sustainable land management in forest areas beyond the reserve boundaries, where the legal restrictions concerning land use enacted for protecting the GRNP do not apply. The concerns of the conservation authority stem from the commonly observed phenomenon whereby the designation

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[4] Communities were aware that the fund constituted a once off transfer. Technically, the funds were part of the final funding round of a five-year EU-funded program supporting the GRNP activities.

of protected area leads to increases in forest-land degradation elsewhere (leakage) or to enhanced rates of habitat fragmentation around the reserve (island park) (Phalan *et al.* 2011, Barlow *et al.* 2007, Laurance *et al.* 2012). The GRNP authorities aim to prevent such potential negative outcomes through conservation payments. Since strict conditional payments were deemed as unpractical by the NGOs involved in our project (either on logistical or political-acceptability grounds), unconditional payments of the type described in the introduction were chosen as the preferred policy mechanism.[5] Our study team collaborated with GRNP authorities to design and implement these CDF mechanisms, while also testing their effectiveness with a randomized experiment.

The objective of the study was to test the impact of receiving aid, distributed by the CDF program under three regimes. The first treatment used a "business as usual" scenario: aid distributed to communities via traditional governing structures, that is, the chief. In the second treatment, aid was handed out to each individual household. The third treatment was an aid-for-work program in which individual households received aid conditional to participating in a public road improvement program.[6] We decided to run a work-for-aid project in which participants cleared and upgraded roads, requiring a level of physical labor comparable to what Sierra Leoneans of both genders are accustomed to.[7] A fourth group of randomly selected villages received no aid.

Under all three aid regimes, each household was allocated 60,000 Sierra Leonean Leone (SLL), or 15 USD,[8] equivalent to six days wage for unskilled labor. The size of a transfer was determined by the NGO and dictated by their project budget. Arguably, the size of the transfer appears small. However, Sierra Leone's GDP per capita in 2011 averaged $498 (WDI, 2015), ranking it as one of the poorest countries in the world. Incomes are likely much lower in rural areas: for example, the poverty headcount in Kenema district was 62 per cent in 2011. The grant was valued at central market prices in Kenema, the main regional town. The total value of the project in each village is substantially higher as the NGO paid for the transportation costs, which constitute a significant subsidy in these remote areas (many times two to three times more than the cost of the goods itself).

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[5] No conditions were set in place. However, in GRNP, the staff often engaged in community-awareness and sensitization activities to promote sustainable land use and limit disturbance to forests. Such activities included messages on the rules within the GRNP (no logging, no mining, no hunting), the value of protecting forests. There were no clear instructions on how to increase sustainable farming, except for the provision of hybrid seeds with potential higher yields.
[6] This last program was implemented in collaboration with the National Commission for Social Action (NaCSA), a government body responsible for implementing food-for-work programs in Sierra Leone, and can be thought of as similar to the National Rural Employment Guarantee Scheme in India.
[7] To ensure we did not confound the effect of making aid conditional on effort with the effect of providing improved public goods we took care to select roads that did not lead directly lead to the participating villages.
[8] 1 USD = 4,000 SLL

Within the program, no cash was distributed. Instead, communities received vouchers with which goods could be ordered from the NGO off a pre-specified list of 40 consumption, investment, and public goods (see Figure 1 for a partial list of their options). Goods were classified in these categories by the staff of the implementing agency in consultation with the research team. The classification of the goods was done prior to implementation. Care was taken to ensure prices on the goods menu reflected local market prices. These lists contained not only prices and item descriptions, but also pictures to facilitate comprehension by the illiterate. Vouchers came in increments of 10,000 SLL and each had a unique identification code. The vouchers were village-specific and their validity was limited to the duration of the intervention. Households holding vouchers could choose to spend vouchers individually, or to bundle vouchers with multiple households or the entire village. The use of vouchers rather than cash in these types of programs arose due to specific regulations set by the collaborating NGO. Based on past experience, the GRNP moved away from making cash transfers to in-kind donations. The use of vouchers as an in-between step allows us to obtain insight into the aid-allocation process within a village.[9]

Figure 1: Menu of goods for voucher orders (section)

MENU

	Description of goods		Price (Le)
01	PALM OIL (PINT)		1,200
02	SALT (BUTTER CUP)		500
03	SUGAR (BUTTER CUP)		1,500
04	MAGGI (PKT)		12,500
05	MAMPO - SANDEGE (PKT)		6,500
06	RICE (BUTTERCUP)		800
07	RADIO		75,000
08	RUBBER BOWL (MEDIUM)		12,000
09	HOE (BIG)		15,000
10	HOE (SMALL)		5,000
11	BRUSHING KNIFE		5,000

14	IVS SEED RICE (BUSHEL)		60,000
15	CASSAVA STICKS - IMPROVED (BUNDLE, 30)		10,000
16	COFFEE SEEDLING		2,500
17	CACAO SEEDLING		2,500
18	OIL PALM SEEDLING - IMPROVED		10,000
19	GOAT HAMMER		8,000
20	FERTILIZER NPK 15/15 FOR RICE (BAG)		115,000
34	PVC ELBOW/ T		12,000
35	ROOFING NAIL (PKT)		25,000
36	NAILS 4" (PKT)		9,000
37	NAILS 3" (PKT)		9,000
38	WATER TANK (1000 L.)		1,300,000
39	WATER TANK (500 L.)		800,000

Upon receiving vouchers, communities had one week to decide what goods they wanted to order. There were no restrictions on pooling or exchanging vouchers. Communities were told representatives holding vouchers would be interviewed

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[9] This refers to whether they were used individually or pooled or swapped or traded in such a way that they would end up in specific hands (for example, in the hands of the elites).

individually to create an order list. On the third visit, goods were distributed to those individuals who ordered them. For a detailed discussion on the distribution of aid and a timeline of activities for each treatment, see Section 4.

Our study took place in 91 villages participating in the program in six of the seven chiefdoms surrounding the park (Figure 2).[10] These villages were chosen for their close proximity to the border of the national park. Treatments were allocated randomly, with stratification at the chiefdom level: 24 villages received aid via the chief, 21 villages via individual households, 24 were offered the aid-for-work treatment, and 22 served as a control group.

Figure 2: Research area
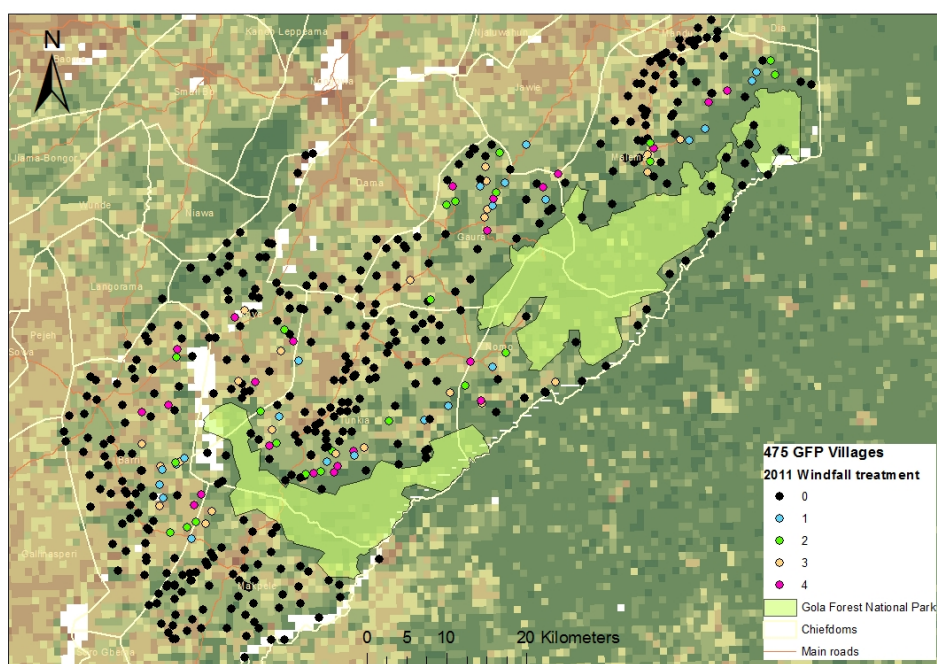
2.2   Primary outcomes and impacts of interest

Our key intermediate outcome of interest is the use of the aid vouchers. For each household we recorded what types of goods were ordered with the vouchers (see Figure 1). These goods can be grouped as consumption goods (i.e., spices and oils for cooking), investment goods (i.e., tools and improved seed), or public goods (i.e., expensive items that are bought with neighbors or goods donated to a public construction project).[11]

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[10] The seventh chiefdom, Makpele, had already allocated the funds to construct a hospital in the chiefdom's headquarter town of Zimmi and was thus excluded from this experiment.
[11] The classification in to consumption, investment and public goods is based on in-depth discussions with the implementing agency and key local experts as well as respondents during our extensive pilots. However, the categories remain to some extent arbitrary.

Our main program impact indicators are grouped as economic, social and conservation outcomes. Per group, we collected a range of variables related to the theories outlined above. As some variables together form one construct, we created families of outcome variables around these. Each family represents mean indices that aggregate over several indicators used to measure a particular concept. This aggregation is based on our survey design and subsequently to some extent arbitrary. Following Klink *et al.* (2005) and Andersen (2008) we created a weighted index representing each family of outcomes (see Section 6 below). In Table 1 we specify the variables included in each outcome family as well as the indices that we constructed for each family.

To test economic impacts, we included indicators for income (both flow E1 to E3) and stock measures (typically assets E4 to E7). As a measure of effort (E8 and E9), we included a question on hours worked per day and a behavioral measure based on an experiment where participation guaranteed respondents a small amount (500 SLL). Engaging in an effort task (cleaning up in the village) resulted in increasing reward (from 500 SLL to 2,500 SLL). We then recorded at what price respondents switched to doing the effort task. In addition, we looked at financial variables (loans, E10 and E11) and savings (E12) and at a behavioral experiment measuring time preferences (E13). Finally, we looked at perceptions of equality and/or inequality in the village (E14).

To assess social and re-distributional impacts we included measures of trust in co-villagers (S1) and sharing (of food, S2). We used two measures of honesty in the village: perception of others (S3), and a village-level measure of honesty in a behavioral experiment (S4) where respondents were asked to report on the outcome of a die-roll that determined how much they had to share with a co-villager, the village deviation from the mean is then a measure of deception. Next, we asked about contributions to public goods (S5) and their perception of the chief (S6). Finally, we asked people about their involvement in conflicts (during the past month, E7) and observed if they made selfish choices in behavioral experiments asking people to share an endowment with a co-villager (S8).

Finally as measures of conservation behavior and attitudes, we used responses to questions pertaining to their involvement in mining, hunting and logging (C1), illegal activities (C2), their support for conservation (C3) and how important forest are (C4, C5). Next, we asked about attitudes towards the implementing agency (C6) and in a behavioral experiment, how much they were willing to share with the NGO from an endowment (5,000 SLL). In addition, in a structured community activity or FFE, we asked villagers to participate in two activities: (i) identify and collect information on potential NTFP from their community farm and (ii) set land aside designated for future NTFP harvesting. We then recorded if communities were willing to participate by demarcating the area (consisting of clearing the boundary of the plot, putting up a fence, putting up signs or pylons, or doing something else of their choosing), passing bye-laws protecting the community forest, and collecting a sample of NTFPs from this plot. We then saw the extent to which villages were willing to

participate in conservation behavior. The FFE provides an ultimate test of the "hearts and minds hypothesis". If villagers are willing to support conservation without immediate compensation by the NGO interested in stimulating conservation behavior, this is a sign that the program was able to align villager preferences with the objectives of the NGO.

Table 1: Outcome indicators

Index	Information or variables used to construct the index
Panel A: Economic outcomes	
Index E1: Income from farm products	Log income from farm products
Index E2: Income from wage labor	Log income from wage labor
Index E3: Other income	Log income from remittances; Log other incomes
Index E4: Productive assets	Do you own a machete
Index E5: Other assets	Do you own a tin roof; a mobile phone; a bed; a table; a torch; a radio; a WC?
Index E6: Farm size	What is your upland rice farm size?
Index E7: Farm productivity	Farm productivity (bushels harvested/bushels sown)
Index E8: Hours work	Number of hours worked in a day
Index E9: Effort AFE	Point where the respondent switched
Index E10: Agricultural loan	Did you receive an agricultural loan in the previous year?
Index E11: Consumption loan	Did you receive a loan for consumption in the previous year?
Index E12: Saving	Do you save money?
Index E13: Myopic AFE	Point where the respondent switched
Index E14: Change in inequality	Change in inequality

Panel B: Social outcomes

Index S1: Trust	Do you hide your money? Do you hide a part of your harvest? Do you trust the chief?
Index S2: Food sharing	Percentage of households in village that you would share food with, Percentage of households that would share food with you.
Index S3: Honesty perception	Are people honest in your village? Is honesty changing?
Index S4: Village level: honesty AFE	Village level average of die rolls (should be 2.5 if people honest)
Index S5: Contribution to public goods	Do you go to community meetings? How many times have you worked in a community project? How many community meetings have you attended?
Index S6: Chief quality	Is the chief good? Is the chief honest about money he receives?
Index S7: Number of conflicts	No of fights with other households; No of fights within your own household; No of fights with the police; No of fights in the village
Index S8: Respondent selfish, based on AFE	Is the respondent selfish (AFE)

Panel C: Conservation outcomes

Index C1: Hunting, logging and mining in community forest	Do villagers mine in the community forest?; Do you allow miners access to the community forest?; Do villagers log in the community forest?; Do you allow loggers access to the community forest?; Do you allow hunters access to the community forest?
Index C2: Allow illegal activities in GRNP	Do you allow miners access to the GRNP?; Do you allow loggers access to the GRNP?; Do you allow hunters access to the GRNP?
Index C3: Support for conversation association in the village	Do you strongly disagree/strongly agree with the statement: we should have a conversation association in the village
Index C4: Healthy community forest is important	Do you strongly disagree/strongly agree with the statement: a healthy Community Forest is important
Index C5: Healthy GRNP is important	Do you strongly disagree/strongly agree with the statement: A healthy GRNP is important
Index C6: I like the GRNP	Do you strongly disagree/strongly agree with the statement: I like the GRNP
Index C7: Dictator game with GRNP AFE	Amount given to GRNP in dictator game
Index C8 : Willingness of village to cooperate with FFE	First visit: Chief willing to cooperate with FFE?; First visit: Community willing to cooperate?; Second visit: Chief willing to cooperate?; Second Visit: Community willing to cooperate?
Index C9: Quality of land for FFE	Land last farmed (years); Distance to the land (minutes); Slope of the land; Is the land good for farming; Plot size

2.3   Theoretical motivation and underlying assumptions

In recent decades international organizations have adopted various approaches to promote conservation in developing countries. Conservation payments to local communities have emerged as a prominent conservation tool (Ferraro 2001, Ferraro and Kiss 2002, Wunder 2007, Milne and Niesten 2009). Such payments are provided in different ways, reflecting both the variation in policy contexts as well as a lack of understanding of the efficiency and cost-effectiveness of different payment modalities. In fact, there is little evidence on the relative performance of

conservation programs (Ferraro and Pattanayak 2006, Pattanayak *et al.* 2010, Miteva *et al.* 2012, Blackman 2012, Cowling 2014, Zheng *et al.* 2013).

We seek to evaluate the conservation impact of one particular type of conservation aid—the provision of livelihood support to local communities without specific conditions attached to a conservation outcome.[12] Recent reviews of conservation funding suggest that, in practice, unconditional payments are a significant conservation policy mechanism growing in popularity (e.g., Miller 2014, Figaj 2010, Hoeffler and Outram, 2011, Hicks *et al.* 2010), especially when attempting to promote conservation outside protected areas (such as in reserve buffer zones). This reflects the realities of conservation policy implementation, where it is difficult to introduce strict conditionality clauses due to various problems. Some of these problems are assigning property rights and ownership over resources, problems of enforcement, and especially problems with the political acceptability of strict conditionality requirements.[13]

The aim of unconditional payments typically is to generate support for conservation, relieving pressure on forest lands or buffer zones surrounding protected areas while providing communities with financial compensation. For example, and in the context of rural Sierra Leone, the aim is to improve habitat connectivity by bringing less forest into the agricultural cycle, or by extending the fallow cycle in shifting agriculture (increasing the amount of 'land left fallow' as well as the natural biomass under fallow). The ultimate policy objective is to prevent the creation of isolated nature reserves. Such 'island parks' provide fewer ecosystem services (less wildlife protection etc.) and may represent an unviable and cost-ineffective investment in the long run (e.g., DeFries *et al.* 2005; Gascon *et al.* 2000; Pfeifer *et al.* 2012). However, while it appears convenient for conservationists and popular among recipients, it is not evident if unconditional payments are an effective way to promote conservation. They are an indirect mechanism, and they affect land use via multiple, possibly offsetting, channels.

The causal pathway in the project was as follows: (i) communities received aid vouchers from the implementing agency, (ii) decided whether to allocate aid for private or community use, (iii) and if for private use, they decided on whether to consume or invest. If invested they decided whether to invest in off-farm employment, or agricultural intensification, or clear more land for agriculture.

The treatments interact with each of these steps. For step (ii), deciding whether to use aid privately or donate for public-use entitlement is crucial. People who worked for aid may feel proprietorial about the aid and are hence more able to resist social

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[12] Such 'unconditional conservation payments' or transfers can be contrasted with so-called PES schemes which, at least in principle, entail conditionality such that payments are only made conditional on specific conservation efforts or outcomes (Ferraro *et al.* 2012, Jack *et al.* 2007).

[13] Indeed, many purported PES-type programs in tropical regions are effectively 'unconditional' in the sense that violation of conditionality is often not penalized (OECD 2010). Unconditional payment schemes are also sometimes seen as potential precursors to eventual PES-type schemes (Caplow *et al.* 2011).

pressures from co-villagers to put the aid to collective use. Aid put to public use has limited potential to directly increase livelihood conditions. Public projects in Sierra Leone typically comprise the construction (or rehabilitation) of public buildings (community *barris,* guest houses, toilets or mosques). While important from a public goods perspective, we do not expect these projects to impact household decisions and economic conditions, at least not within the relatively short time frame of the study (two years).

For step (iii), when deciding if they should consume or invest, mental accounting theories (Thaler and Shefrin 1981) predict that unexpected windfall gains induce different spending decisions than anticipated income flows. The theory of mental accounting assumes that people group their financial resources into "mental accounts" and make spending decisions based on these small groups, rather than grouping all resources together to make an integrated optimizing decision (Milkman and Beshears 2008). Subsequently, the propensity to consume will be higher for an unexpected windfall gain than for an anticipated income flow, while the propensity to invest will be higher for earned income than for the unexpected windfall gain. Hence, unexpected windfall gains will increase immediate consumption, while expected income earned will increase future consumption, with obvious implications for time preferences of the household receiving the cash transfer. Hence, according to theories of mental accounting, unexpected windfall gains may have worse long-term impacts than expected income increases.

Alternatively, payments may relax binding constraints, enabling communities to alter their land-use practices or engage in off-farm employment. Such behavioral changes could reduce pressure on marginal lands (Banerjee and Newman 1994, Wunder *et al.* 2008, Angelsen and Kaimowitz 1999). For example, transfers may be used to improve agricultural efficiency through increased fertilizer use, reducing pressure at the "extensive margin" to grow food (Bationo *et al.* 2012, Louhichi and Gomez y Paloma 2014). In addition, there could be an income effect associated with transfers, which could increase the demand for leisure. In the context of labor scarcity and imperfect labor markets, extra consumption of leisure could also relieve pressure on natural habitat. However, the impact of transfers need not necessarily be benign on conservation. Indeed, some analysts have voiced concerns that unconditional transfers might backfire from a conservation perspective. For example, transfers may alleviate constraints on land management practices that encourage additional land clearance (Angelsen and Kaimowitz 2001, Lybbert *et al.* 2011). For example, a shortage of labor limits agricultural activity in Sierra Leone (Cartier and Bürge 2011). In that context, unconditional payments could fund labor-saving tools that facilitate the clearing of natural vegetation. Of course it is also possible that payments are spent in ways that do not impact land-use practices in any discernible way. Further, it is likely that the impact of payment schemes varies across communities, mediated by factors such as market access and agricultural suitability (Pfaff 1999, Kinnaird *et al.* 2003, Pfaff *et al.* 2009). Large-scale transfer schemes may have general equilibrium effects (affecting prices of factors and commodities) in cases where local economies are imperfectly integrated in regional

economies (e.g. Angelsen *et al.* 2001). For example, if local demand for labor increases, wages are bid-up which might invite an inflow of agricultural labor. In sum, theoretical predictions with respect to the conservation effects of unconditional payments are fundamentally unclear.

In addition, there is a direct causal pathway by which aid would impact conservation behavior and attitudes. Unexpected windfall gains—if households know from whom and why they are receiving the cash transfer—are an offering from the funding agency to the rural community. Rabin (1993) discusses so-called reciprocity theories: households will display reciprocity towards a benefactor who has provided unconditional support. In our setting, households know that the windfall gain was provided by a forest conservation organization (i.e. the GFP). We expected that such a gift would make households more willing to display support for the objectives of the benefactor: more sustainable use of communal forest outside the reserve, enhanced eagerness to enforce conservation rules in the nature reserve, improved attitudes towards the donor NGO, increased willingness to sign up for voluntarily conservation activities suggested by the NGO, etc. If reciprocity were a significant motivating factor, we would expect more support for conservation objectives in windfall villages compared to those who received conditional aid via a work-for-aid scheme. These communities already paid for their aid, and could ostensibly feel that they owe nothing back to the NGO. Theories of reciprocity, or the 'winning hearts and minds' argument for providing aid, have experimentally been tested in several other contexts (McNeely 1993, Beath *et al.* 2012, Andrabi and Das 2010).

Lastly, empirical and theoretical findings suggest that the impact of aid is dependent on the quality of institutions and governance modalities through which aid is channeled (Khwaja 2009, Acemoglu *et al.* 2014, Dalgaard and Olsson 2008, Beekman *et al.* 2013, 2014). Empirical evidence suggests that centralized versus decentralized aid provision does influence outcome variables, though the direction of change appears to be case and context specific (Acemoglu *et al.* 2014, Binswanger-Mkhize *et al.* 2009). Hence, we explore whether within our specific social and institutional context in Sierra Leone, the type of effects described above would be mitigated or even reversed if aid was provided and administered via a more decentralized mode (household level) compared to the more centralized mode of delivery (aid distributed via the chief).

In summary, we lay out a theory of change for each of our three treatments:

A. Unconditional aid through the chief:

- Community receives promise of unconditional aid in kind at the group level
- Chief organizes the use of the aid
- Community is happy about the improvement in their village caused by the aid
  - Communities with inclusive leadership and strong participatory processes may feel more pleased because the NGO gave aid through the chief

- o Communities with self-interested leadership and weak participatory processes may feel less pleased because the NGO gave aid through the chief
- Community displays appreciation for the gift by supporting conservation goals

B. Unconditional aid to the individual:

- Community receives promise of unconditional aid in kind at the individual level
- Individuals use the aid for consumption, investment, or public goods, depending on individual need and mental accounting
- Individuals are better off due to the aid
  - o This could lead to more conservation if the aid makes people less dependent on depleting the forest for income
  - o This could lead to less conservation if the aid makes people expand their farming
- Individuals display appreciation for the gift by supporting conservation goals

C. Conditional aid to individuals:

- Community receives promise of aid at the individual level conditional to participating in work projects
- Individuals use the aid for consumption, investment, or public goods, depending on individual need and mental accounting
- Individuals are better-off due to the aid
  - o This could lead to more conservation if the aid makes people less dependent on depleting the forest for income
  - o This could lead to less conservation if the aid makes people expand their farming
- Individuals feel they earned the aid and do not feel reciprocity towards the NGO

When the aid is given through the group to the chief, we expect to see less individual benefits and more public goods. This reduces the income effect compared to the individual treatments. When we make individual aid conditional on work, this reduces the reciprocity motive relative to the individual unconditional aid. These are the main mechanisms we test with our treatment design.

3. Context

3.1 Site selection

Our sample consisted of 91 villages in six of the seven chiefdoms surrounding the park, Barri, Gaura, Koya, Malema, Nomo and Tunkia chiefdoms. These villages were chosen for their close proximity to the border of the national park. The site was selected for this study for various reasons. First, this particular conservation program is one of the most important of its kind in tropical ecosystems. Second, there are very few (hardly any RCT) studies on such conservation aid programs of the type described above and hence pursuing this research opportunity entailed considerable academic interest. This is considered a huge gap in the conservation

and biodiversity policy literature (Ferraro and Pattanayak 2006, Pattanayak *et al.* 2010, Miteva *et al.* 2012, Blackman 2012). Lastly, our research team was working in the region on other projects and hence there were synergies and added benefits in pursuing this particular work in the same region. Undertaking this study at this particular time was a rare opportunity in that the conservation organization had not distributed any aid to the communities we were to work in and hence we had the chance of working with the experimental subjects that were not 'contaminated' by any previous similar aid policies.

3.2   Local context

The study region is located in eastern Sierra Leone, in Pujehun and Kenema districts. The seven chiefdoms surrounding the GRNP have been part of conservation activities of the park since its creation in 1924. Local populations around the park depend to a large extent on agriculture and forest-related goods and services. To protect the part from deforestation for agriculture, logging or mining activities, the GRNP was created by the Ministry of Agriculture, the Conservation Society of Sierra Leone and UK's Royal Society for the Protection of Birds. The GRNP is a 71,000 hectare acres of upper Guinean moist tropical forest and spans seven chiefdoms, across the districts of Kailahun, Kenema, and Pujehun. The national park status was officially gazetted as recently as in 2010, but has evolved over the last 20 years through conservation aid donations and efforts by external NGOs and local governments and conservation agencies. Protection of the nature reserve derives foremost from restrictions on logging and extraction of plant, animal and mineral resources. Most GRNP resources and efforts are used to compensate local communities for these restrictions, and to monitor and enforce them. Satellite and ground truth evidence suggest that the objectives of protecting the reserve itself have been largely met (Gola Rainforest Conservation LG 2013).

Most of the land within the seven chiefdoms in which the GRNP is located, is owned and managed by communities. Agricultural practices include low levels of external inputs and largely involve subsistence slash-and-burn rotational cropping of annual crops (rice, cassava, vegetables). There are also communal plantations of coffee, cacao, and palm oil. The use of fertilizer in the region is very low, as most communities do not have access to the necessary markets and transportation costs are high (Cartier and Bürge 2011, Casaburi *et al.* 2013). Land is generally tilled for one to two years and left fallow for the subsequent six to 10 years (Bulte *et al.* 2013). Farmland derived from mature forests is generally higher yielding and allows shorter fallow periods for the first few agricultural cycles after clearance. However, clearance of mature forest is difficult for farmers in Sierra Leone, as most vegetation clearance is conducted with low-grade machetes.

Labor is a limiting factor for agricultural activity in Sierra Leone. Upland slash-and-burn agriculture is estimated to require 185 man-days/ha on average for the entire agricultural cycle (MAFFS 2004, Sammeth *et al.* 2010) and 309 man-days/ha for lowland or swamp rice fields. Unskilled labor costs approximately LE 6,000–7,000 ($1.60) per day, which exceeds the income from rice production, so labor markets

are very imperfect (Sammeth *et al.* 2010). In the study region, most labor used for farming is mobilized within the household or derives from labor-exchanging teams based on reciprocity (Cartier and Bürge 2011 and references therein). The average farm household cultivates small plots of land of just 1.56 ha on average, and the majority of holdings are 0.5 - 2 ha in size (MAFFS 2009, Louhichi and Gomez y Paloma 2014).

In recent years, the GRNP authorities have emphasized the promotion of sustainable land management in forest areas beyond the reserve boundaries, where legal restrictions on resource use enacted for protecting the GRNP do not apply. The concerns of the conservation authority stem from the commonly-observed phenomenon that designing protected area in one place leads to increases in forest land degradation elsewhere (leakage) or to enhanced rates of habitat fragmentation around the reserve (island parks) (Phalan *et al.* 2011, Murcia 1995, Rudel and Roper 1997, Barlow *et al.* 2007, Laurance *et al.* 2011 and 2012). Agricultural expansion and habitat fragmentation is believed to be the primary threat to forests in the national park (Gola Rainforest Conservation LG 2013) and, indeed, in Africa more widely (Geist and Lambin 2002, Benhin 2006). For this reason GRNP authorities and its partners engage with communities close to park boundaries, amongst others via a system of conservation payments. Since conditional payments were regarded as unpractical (on both logistical and "political acceptability" grounds), unconditional payments were chosen as the preferred policy mechanism. The underlying objective of the payment scheme is to reduce the amount of land that is cleared for farming. If households clear less land (extending the fallow cycle), the area under fallow goes up and the average age of fallowed land increases. Both effects are expected to enhance the connectivity of patches of nature, and facilitate the movement of animal (and perhaps plant) species. In addition, GRNP hopes to limit land clearance by (commercial) loggers or for mining. As all land in Sierra Leone is private land, communities have considerable autonomy over access rights. Commonly an individual seeking to log trees in a community can only do so with the permission of the village chief and landowner. This extends to hunting as well.

We reported on the impacts of a relatively small transfer program. In the program, each household received $15, less than what is given in several cash transfer programs, such as Give Directly. Two recent large-scale and rigorous evaluation studies, implemented in the Democratic Republic of Congo and Sierra Leone, found that community-driven development interventions with larger levels of support achieved little in terms of improved welfare (Humphreys *et al.* 2012, Casey *et al.* 2012). It should be noted that GDP per capita in Sierra Leone in 2011 stood at an average of $374, according to the World Bank in 2013. This is likely much lower in rural areas (for example the poverty headcount in Kenema district was 62 per cent in 2011). The participants in our study could choose from a menu of goods valued at central market prices in a regional town (Kenema). This implies that the total value of the resources delivered to each village is substantially higher as the NGO took care of the transportation costs, which constitute a significant amount in these remote areas.

3.3   External validity

The study is located in a fairly remote area of the country. Compared to national average, people are on average poorer and more reliant on rain-fed agriculture. Sierra Leone, as in many other African countries, is characterized by a dual system of state and non-state governance at various levels: at the village level, chiefs enjoy considerable autonomy and control access to land, labor and marriage (Richards 1986). Several villages make up a chiefdom section, and chiefdoms are composed of several sections. The paramount chief rules over the chiefdom, and is the highest traditional authority and lowest level reached by the national administration, but a legacy of weak state presence at the rural level has led to a high level of autonomy in this office.

4. Timeline

4.1   Timeline of the program

Each community was visited six times (see Figure 3). During the first visit, in April 2011, we collected baseline survey and behavioral experiments data from approximately 30 households per community, creating a total sample of 2,369 households. We then organized a public lottery to allocate villages to treatment arms. At the village meetings, representatives from each participating village were present at the meeting. During a second visit, a pre-announced village meeting was held in which a representative from the GRNP and a member of the research team explained the program. During the same visit or one week later after the work program (if applicable) vouchers were distributed as well as a list of goods that could be ordered with the vouchers.

Figure 3: Project timeline

January-March 2011:	1. Baseline survey
	2. Explanation of intervention
	-Aid-for-Work program
	-Distribution of vouchers
	3. Orders received
	4. Goods delivered
November 2011:	5. Midline Survey
May-June 2013:	6. Endline Survey

Under the aid-for-work treatment, after the program was explained, households were given the opportunity to work to earn vouchers instead of receiving vouchers immediately. Households were divided into two groups, working on alternate days to mitigate the burden of leaving the farm for a continuous string of days. Each

household sent a representative and received one voucher for each day of work for a maximum of six days. Households earned 99.3 per cent of potential vouchers, indicating that attrition in response to the treatment is negligible.

During the third visit, one week after the vouchers had been distributed, a team returned to record orders. Household representatives holding vouchers were each interviewed individually and an order sheet was drawn up. Household representatives holding vouchers were interviewed individually. We recorded their orders and conducted a brief survey about potential pooling of vouchers and swapping or exchange. Each household received a copy of the order as a receipt. In the fourth visit, goods were distributed to individual households or village representatives, depending on the treatment.

Figure 4: Interview roll out baseline and endline
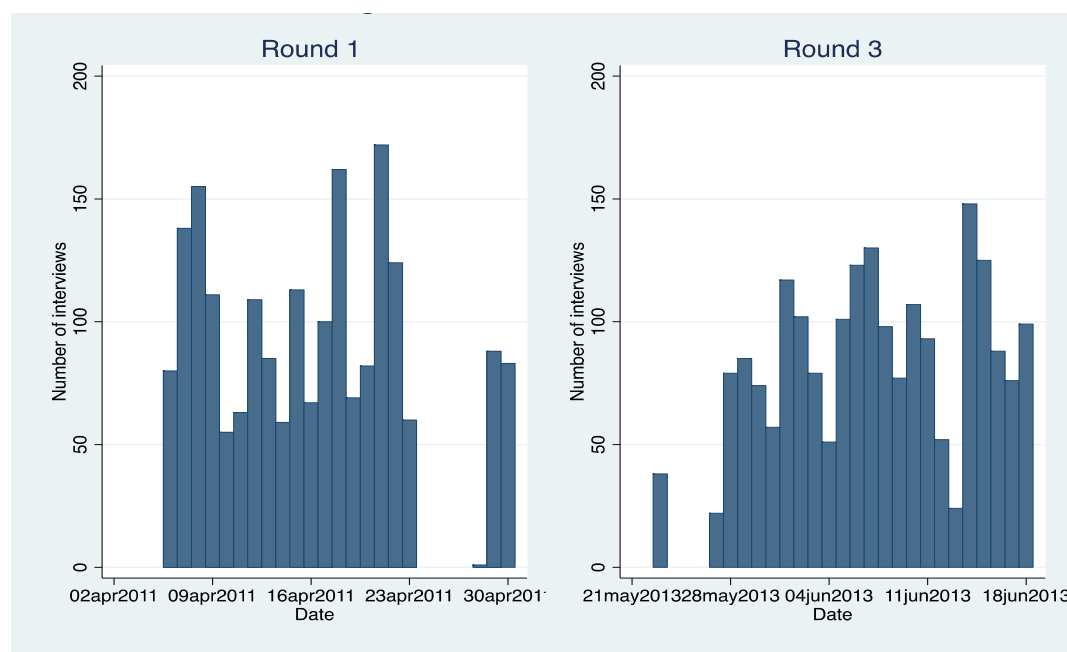
We collected midline data during September and October 2011, revisiting the households included in the baseline (Figure 4). Due to an error in the field, one village was not treated, creating a sample of 90 villages. The midline sample consisted of 2,262 households. We collected endline data during May–June 2013, we again revisited the same household, with a total sample of 91 villages and 2,228 households.

The timing of the intervention and survey work was focused on the dry season in Sierra Leone when opportunity costs of time are typically low. Typically labor demands are highest for ploughing and planting during June–August (Richards 1986).

5. Evaluation: Design, methods, and implementation

5.1   Ethical review

This study was approved by the ethical review board of Wageningen University (WU2012014) and Njala University (FWA00018924).

5.2   Evaluation strategy

Below we describe what types of goods were ordered across the various treatments and whether they were used privately or for the benefit do the whole community. Next, we assess the compare outcomes across our three treatment arms and control group. For the current report we limit ourselves to looking at the endline data only. The estimation strategy is detailed below.

5.3   Sample size and attrition

Our sample consisted of 91 villages in six of the seven chiefdoms surrounding the GRNP, Barri, Gaura, Koya, Malema, Nomo and Tunkia Chiefdom. These villages were chosen for their close proximity to the border of the national park. Due to budgetary restrictions of the implementing agency, the sample size could not be determined based in power calculations. Treatments were allocated randomly within this universe of 91 villages, with stratification at the chiefdom level: 24 villages received aid via the chief, 21 villages to households individually, 24 enrolled in the earned aid treatment, and 22 served as a control group. Within each village up to 30 heads of households were interviewed. Baseline sample consisted of total sample of 2,379 households and the endline sample of 2,251 households. Our study was likely underpowered. Appendix Table A1 shows our sample size (30 respondents per village, 23 villages per treatment arm, inter-cluster correlation of 10 per cent and power of 0.8) and the minimum detectable effect size (in levels and percentages) for a wide range of variables, such as income, community characteristics. We were able to detect on average increases over 25 per cent over the mean values (the median is 20 per cent due to some extreme values), though this ranges from just below 10 per cent for some variables.[14] While the implementing agency had high expectations for the program to alleviate poverty and increase conservation, these expectations were not specific enough to be quantified.[15]

Overall attrition at the village level was 0 per cent, at the household level about 33 per cent. Temporary mobility among these communities was seen to be high. With farms being several hours walking distance away from the village, often, people would make farm huts to sleep overnight, sometimes for several days at the time. At the same time market days were seen to attract many people. Due to logistical and financial constraints, the research team was not able to track each respondent by either waiting around for people to return to the village or by revisiting the

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[14] We use the STATA package cluster sampsi for the power analysis.
[15] See GRNP (2007) Gola Forest National Park Management Plan 2007–2012.

community at a later date. In this light re-interviewing, 67 per cent of the sample was high. In addition, the attrition rate was similar to surveys in other developing countries (see Alderman *et al.* 2001 who report attrition rates up to 50 per cent). Attrition rates were seen to be slightly different across treatments. They were lowest in T3, the work for aid treatment (28 per cent), and highest for the control group (37 per cent). For T1 (windfall aid to households), attrition was 30 per cent and for the aid via the chief treatment arm (T2) it was 35 per cent.

We assess the nature and direction of attrition between baseline and endline in Appendix Tables A2 and A3. First, we compare the means of a range of baseline characteristics. Of the 10 indicators included, seven are insignificant, suggesting attrition was relatively random. We do see that drop-out households are more likely to own a phone, suggesting they may be more affluent, though this is not confirmed by larger farm size (a key proxy of household wealth, Richards 1986). Drop out households are also less likely to say they think people in their village are honest, yet at the same time also state they would share the harvest others.

Second, in Table A2 we follow Fitzgerald *et al.* (1998) and estimate a probit model of 2011–2013 attrition on a range of 2011 household characteristics. These results, presented in Table 2, largely confirm the t-test outcomes. In sum, the results indicate that attrition is low and not likely to affect our results.

5.4   Balance

Table 2 summarizes our data across the four treatment arms for a key set of baseline characteristics. Villages are balanced across observable characteristics collected during the baseline survey, including age, gender, farm size, if respondents hide their harvest from fellow villages (1 if yes), if respondents feel people in their village are honest (1 if yes), if respondents trust their chief (1 if yes), the number conflicts they had in the village during the previous month, the number of times respondents worked on community project during the previous month, how often they attended community meetings, distance to market towns and village size. Of the p-values reported, very few are below 0.1, providing confidence that the sample is well-balanced.

Table 2: Balance statistics

	C: Control			T1: Windfall aid			T2: Chief			T3: Earned aid			p-values					
	N	mean	se	N	mean	se	N	mean	se	N	mean	se	C-T1	C- T3	C- T2	T1- T2	T1- T3	T2-T3
Age	573	39.95	0.61	541	38.31	0.60	651	39.10	0.56	578	39.31	0.61	0.094	0.921	0.395	0.358	0.215	0.602
Male (1=yes)	573	0.66	0.02	553	0.60	0.02	657	0.59	0.02	591	0.58	0.02	0.337	0.202	0.194	0.867	0.768	0.850
Tin roof (1=yes)	569	0.33	0.02	549	0.32	0.02	656	0.34	0.02	579	0.39	0.02	0.769	0.879	0.821	0.983	0.671	0.729
Hours worked (per day)	573	5.69	0.09	550	5.95	0.09	653	6.12	0.09	589	5.94	0.10	0.259	0.102	0.019	0.214	0.584	0.507
Farm size (acres)	565	5.30	0.23	541	5.44	0.22	634	5.19	0.21	578	5.17	0.25	0.972	0.527	0.658	0.628	0.540	0.348
Hide harvest (1=yes)	557	0.63	0.02	543	0.64	0.02	644	0.60	0.02	580	0.60	0.02	0.922	0.773	0.993	0.918	0.694	0.790
People are honest (1=yes)	577	0.89	0.01	553	0.92	0.01	655	0.90	0.01	590	0.93	0.01	0.441	0.648	0.883	0.596	0.834	0.777
I trust my chief (1=yes)	559	0.83	0.02	527	0.90	0.01	636	0.86	0.01	571	0.88	0.01	0.415	0.445	0.662	0.634	0.847	0.718
# conflicts in the village (past month)	577	0.61	0.05	529	0.53	0.04	658	0.58	0.05	552	0.62	0.06	0.663	0.418	0.605	0.966	0.669	0.677
# worked on community project (past month)	577	2.64	0.11	549	2.82	0.10	658	3.01	0.10	586	3.08	0.10	0.311	0.115	0.315	0.951	0.592	0.518
Attend community meetings	576	2.77	0.12	552	3.07	0.15	658	2.98	0.11	585	3.25	0.12	0.301	0.084	0.678	0.383	0.499	0.062
Distance to Chiefdom Center	22	11124.1	1044.5	22	9962.8	1498.8	24	9569.8	1199.4	24	9569.8	1199.4	0.859	0.694	0.698	0.911	0.901	0.985
Village size	22	44.9	5.7	22	36.3	5.0	24	39.1	6.0	24	39.1	6.0	0.429	0.971	0.470	0.181	0.527	0.577

Notes: Table reports sample per treatment, mean values and clustered standard errors as well as p-values of the differences between treatments arms.

5.5   Surveys and experimental data

Our main outcome variables came from survey and behavioral experiments data. We collected two types of survey data. First, we implemented a survey tracking the use of the aid. For each household that held vouchers, we recorded whether types of goods were ordered with the vouchers (see Figure 1), these goods are grouped as consumption goods, investment goods, and public goods. In addition, in each village we recorded how aid was used, again recording the percentage of aid that went to consumption, investment and community goods. Second, we implemented a community and household survey on our main economic, social and conservation indicators. Survey instruments are included in the appendix. Table 1 lists the main outcome indicators used. For some outcome indicators, we also collected behavioral experimental data. Here we asked respondents to make one or more choices over incentivized alternatives. In addition, during the endline data collection, we implemented a structured activity, or a so-called FFE (see Harrison and List 2004). We asked villagers to participate in two activities (i) to help identify, and collect information on potential NTFP from their community farm and (ii) to participate in setting land aside designated for future NTFP harvesting.

5.6   Data quality control

We made every effort to ensure data quality. Our research assistants were extensively trained and engaged in piloting the design of the data collection instruments. During data collection, teams were divided in teams of six with a team leader responsible for checking surveys, inspecting team performance and data processing. Teams were spot-checked at random intervals by our field coordinator. In addition there was daily phone interaction with the teams to report on progress and field developments. As soon as the first data came in, data was manually entered on project laptops by the data entry team, a group of experiences Njala University students. Data entry was overseen by a Wageningen MSc student. To ensure data quality, a random subset of 40 per cent of the data was re-entered. Data was stored at Wageningen University servers. Data cleaning and coding took place at Wageningen by the research team.

6. Impact analysis and results of the key evaluation questions

6.1   Outcome variables and identification strategy

We analyzed the effect of the interventions on direct and indirect outcomes. For direct outcomes, we assessed the types of goods orders. First, did participants spend their vouchers on public or private goods? If they spent them on public goods, we examined the type of project implemented, the completion status of the project, the quality of the project. If they spend the vouchers on private goods, we examined if they purchased goods for consumption or for investment.

For indirect outcomes, we assessed the impact of the interventions on (i) economic, (ii) social, and (iii) conservation outcomes across treatment groups. Each group of outcomes are comprised of a subset of variables or indicators described in Table 1.

These families of variables were used to construct an index that measures the average treatment effect across all indicators in a particular family. In Tables 3 to 5 below we specify in more detail the variables included in each outcome family. For each family we created a 'mean effect' by rescaling all variables such that higher values indicate better outcomes, normalizing all variables by the average and standard deviation of the control group, adding these together and renormalizing (see Klink *et al.* 2005, Andersen 2008). Outcomes then have a mean of "0" and a standard deviation of "1" in the control group. Coefficients in the analysis therefore represent standard deviations changes relative to the control group.

6.2 Economic indices

We analyzed 14 families of economic indicators or outcomes. Some families only contain one variable, others contain multiple. Index E1, for example, contains only the log of income from farm products. We used the logarithm to reduce the effect of outliers and do the same for all income indices. We divided assets into productive and other assets. To form the index for farm productivity, we divided the amount harvested by the amount sown.

Table 3: Economic outcomes

	Obs	Mean	Std. Dev.	Min	Max
Index E1: Income from farm products					
Log income from farm products	2209	8.18	5.37	0	15.52
Index E2: Income from wage labor					
Log income from wage labor	2192	4.33	5.22	0	15.20
Index E3: Other Income					
Log income from remittances	2188	5.09	5.45	0	15.20
Log other income 1	2243	3.91	5.66	0	15.76
Log other income 2	2224	0.76	2.89	0	14.91
Index E4: Productive Assets					
Do you own a…					
...Machete? (1=yes)	2251	0.89	0.32	0	1
Index E5: Other Assets (1=yes)					
Do you own a…					
...Tin roof?	2249	0.35	0.48	0	1
...Mobile phone?	2249	0.22	0.41	0	1
...Bed?	2251	0.92	0.27	0	1
…Table?	2251	0.61	0.49	0	1
...Torch?	2251	0.83	0.38	0	1
...Radio?	2251	0.36	0.48	0	1
…WC?	2249	0.37	0.48	0	1
Index E6: farm size					
Number of acres rice sown?	2230	2.71	1.86	0	26
Index E7: farm productivity					
Farm productivity (bushels harvested/ bushels sown)	2121	2.92	2.35	0	28.57
Index E8: hours work					
Number of hours worked in a typical day	2241	5.43	2.14	0	13
Index E9: Effort AFE					
Point where the respondent switched	2099	4.70	1.70	1	7
Index E10: Agricultural loan					
Did you receive an agricultural loan in the previous year? (1=yes)	2251	0.11	0.31	0	1
Index E11: Consumption loan					
Did you receive a loan for consumption in the previous year? (1=yes)	2251	0.26	0.44	0	1

Index E12: Saving					
Do you save money? (1=yes)	2247	0.37	0.48	0	1
Index E13: Myopic AFE					
Point where the respondent switched	2118	3.31	1.97	1	7
Index E14: Change in inequality					
Change in inequality	2245	2.00	0.90	1	3

Data are from endline survey and AFEs.

6.3 Social indices

Table 4 contains the families of social indicators. In Index S1 we combine measures of trust in co-villagers and in the village chief. The food-sharing index measures the willingness of the respondent to share food with others and the willingness of others to share food with the respondent. The honesty perception index contains both general honesty and feelings about how honesty is changing in the village. To assess contribution to public goods we looked at the amount of time they devoted to community meetings and community projects. We combined several different kinds of fights into one measure of conflict in the village.

Table 4: Social outcomes

	Obs	Mean	Std. Dev.	Min	Max
Index S1: Trust					
Do you hide your money? (1=yes)	2221	0.70	0.46	0	1
Do you hide a part of your harvest? (1=yes)	2227	0.57	0.49	0	1
Do you trust the chief? (1=yes)	2157	0.94	0.24	0	1
Index S2: Food sharing					
% of households in village that you would share food with	2242	0.09	0.10	0	1
% of households that would share food with you	2238	0.08	0.08	0	1
Index S3: Honesty perception					
Are people honest in your village? (1=yes)	2240	0.96	0.20	0	1
Is honesty changing? (1=decreasing, 2=same, 3=increasing)	2246	1.25	0.56	1	3
Index S4: Village level: honesty AFE					
Village level average of die rolls (should be 2.5 if people are honest)	90	1.12	0.51	0.3	2.74
Index S5: Contribution to public goods					
Do you go to community meetings? (1=yes)	2219	0.96	0.19	0	1
How many times have you worked in a community project?	2217	3.32	3.16	0	40
How many community meetings have you attended?	2237	3.46	3.48	0	50
Index S6: Chief quality					
Is the chief good? (1=yes)	2161	0.94	0.24	0	1
Is the chief honest about money he receives? (1=yes)	2160	0.87	0.34	0	1
Index S7: Number of Conflicts					
No of fights with other households (past month)	2117	0.48	1.10	0	12
No of fights within your own household (past month)	2122	0.79	1.47	0	20
No of fights with the police (past month)	2093	0.07	0.44	0	8
No of fights in the village (past month)	2091	0.09	0.80	0	20
Index S8: Selfish (based on AFE)					
Is the respondent selfish (1=yes)	2156	0.24	0.43	0	1

Data are from endline survey and AFEs.

6.4 Conservation indices

Conservation outcomes are grouped in Table 5. Here we draw from survey data and an FFE. There were found to be several illegal activities possibly occurring in both the community forest and the GRNP: mining, logging and hunting. We looked at the amount of illegal activities in the GRNP and the community forest separately. For the FFE, we looked at all the moments in time decisions were made to join or not: the initial reaction of the chief, the reaction of the village meeting and their decisions at the second visit. For the final index, we used several measures for the quality of the land, including the quality, the size, distance to the village. Some of these variables were flipped so a higher value meant a higher quality.

Table 5: Conservation outcomes

	Obs	Mean	Std. Dev.	Min	Max
Index C1: Illegal activities in the community forest					
Do villagers mine in the community forest? (1=yes)	2241	0.08	0.28	0	1
Do you allow miners access to the community forest? (1=yes)	2242	0.12	0.32	0	1
Do villagers log in the community forest? (1=yes)	2242	0.21	0.41	0	1
Do you allow loggers access to the community forest? (1=yes)	2242	0.30	0.46	0	1
Do you allow hunters access to the community forest? (1=yes)	2242	0.21	0.41	0	1
Index C2: Illegal activities in GRNP					
Do you allow miners access to the GRNP? (1=yes)	2249	0.00	0.02	0	1
Do you allow loggers access to the GRNP? (1=yes)	2249	0.00	0.04	0	1
Do you allow hunters access to the GRNP? (1=yes)	2249	0.00	0.03	0	1
Index C3: Conservation association					
...We should have a conservation association in the village (0 = completely disagree, .., 5 = completely agree)	2250	3.60	0.94	0	4
Index C4: Healthy community forest					
…A healthy Community Forest is important (0 = completely disagree, .., 5 = completely agree)	2250	3.82	0.53	0	4
Index C5: Healthy GRNP					
...A healthy GRNP is important (0 = completely disagree, .., 5 = completely agree)	2250	3.77	0.64	0	4
Index C6: I like the GRNP					
...I like the GRNP (0 = completely disagree, .., 5 = completely agree)	2250	3.83	0.58	0	4
Index C7: Dictator game GRNP					
Amount given to GRNP in dictator game	2143	802.38	831.35	0	4000
Index C8: Willingness to set aside land (FFE)					
First Visit: Chief willing to cooperate with FFE? (1=yes)	90	0.93	0.25	0	1

First Visit: Community meeting willing to cooperate? (1=yes)	91	0.90	0.30	0	1
Second Visit: Chief willing to cooperate? (1=yes)	79	0.78	0.41	0	1
Second Visit: Community meeting willing to cooperate? (1=yes)	83	0.78	0.41	0	1
Index C9: Quality of land (FFE)					
Land last farmed (years)	58	21.81	16.16	2	80
Distance to the land (minutes)	65	23.57	35.27	1	270
Slope of the land (1=flat, .., 4= steep)	66	2.23	1.00	1	4
Land good for farming (1=poor quality, .. , 4 = high quality)	66	3.82	0.49	1	4
Plot size (acres)	65	6.18	13.00	1	100

Data are from endline survey and AFEs.

6.5 Empirical strategy

To estimate average treatment effects, we regress the relevant outcome variable (Y_j) for village *j* (with j = 1,..., 91) on the binary treatment variables T1, T2 and T3, where T1=1 indicates "windfall aid to households", T2=1 indicates "windfall aid via chiefs" and T3=1 indicates "earned aid or aid for work". The omitted category is the control group.

$$Y_j = \alpha + \beta_1 T1_j + \beta_2 T2_j + \beta_3 T3_j + \varepsilon_j \tag{1}$$

ε_j is an error term and the β's are the coefficients of interest. These represent standard deviation changes with respect to the control group. We add a test comparing the coefficients across treatments at the bottom of each table. In models based on household data (Y_{ij}) we cluster standard errors at the village level.[16]

6.6 Empirical results and interpretation of estimates

In this subsection we discuss the main findings. First we show what types of goods were ordered with the vouchers across the various treatments: private, public goods or both. Second, we discuss the impact of the CDF program on the range of indirect outcome indices.

6.7 Aid allocation and use

First, we looked at what type of goods people ordered for their aid vouchers (Figure 5). We asked respondents that came to redeem the vouchers in their possession whether they intended to use the aid for private benefit, for the whole community or for both. As is apparent from the figure there was a high allocation to community

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[16] As most of our indicators are at the respondent level, we run regressions rather than compare averages using t-tests, allowing is to control for within village clustering and sample weights.

projects across the treatments. On average about 65 per cent of vouchers were used to benefit the whole community. This was most pronounced when vouchers were distributed through the chief, where 83 per cent of aid was intended to go to community projects (T2 > T1, p-value = 0.01, T2 >T3, p-value = 0.05).

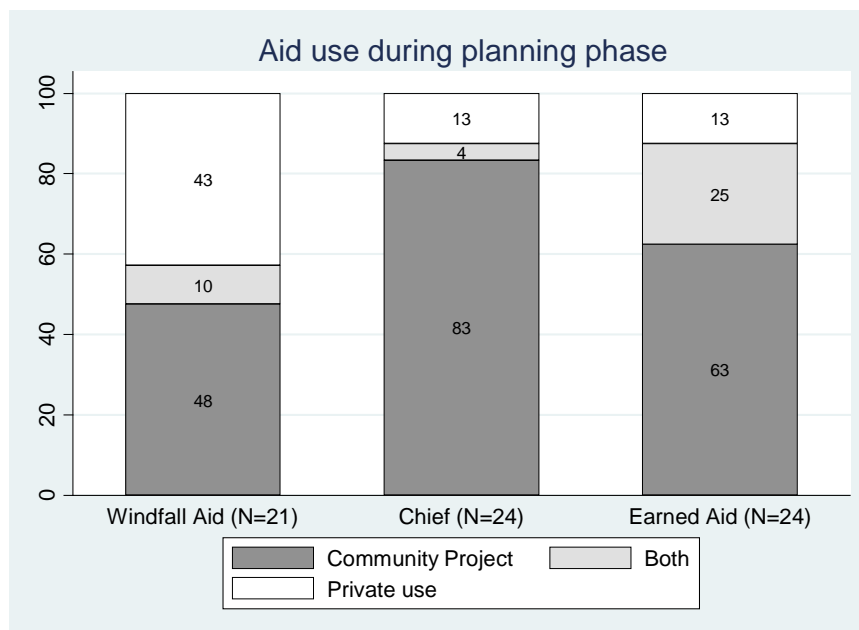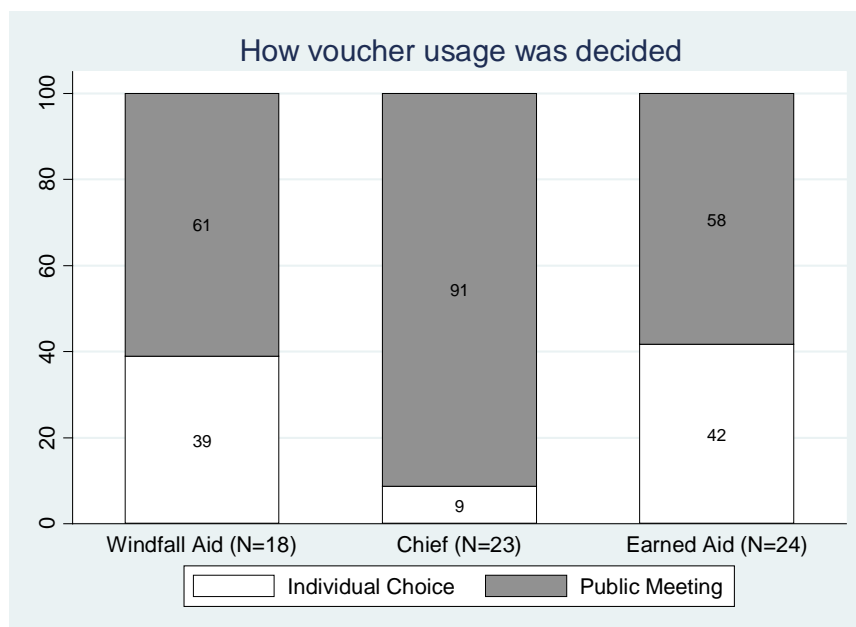**Figure 5a: Intended aid use and coordination process during planning phase**


Figure 5b: The coordination process: deciding on voucher use

Note: numbers in graphs refer to column percentages.

We also asked respondents how the voucher use was decided on, via a public meeting or not (Figure 5b). In most villages (on average 70 per cent), aid allocation was decided in a village meeting. This was significantly higher when aid was disbursed through the chief, where in 91 per cent of villages aid was allocated in a village meeting (T2 > T1, p-value = 0.001, T2 >T3, p-value = 0.004). This suggests the high allocation to community projects may be explained by the decision-making process.

Next, we looked at actual aid use at the endline. During the endline survey in our village survey we asked how aid was actually used. Figure 6 summarizes the results (T2 > T1, p-value = 0.04, T2 > T3, p-value = 0.001. We see that the share allocated to community projects versus private use changed compared to initial plans (Figure 5a and 5b). The share allocated to community projects share increased in the windfall aid villages but reduced in the villages where aid was earned.

Figure 6: Aid use at endline
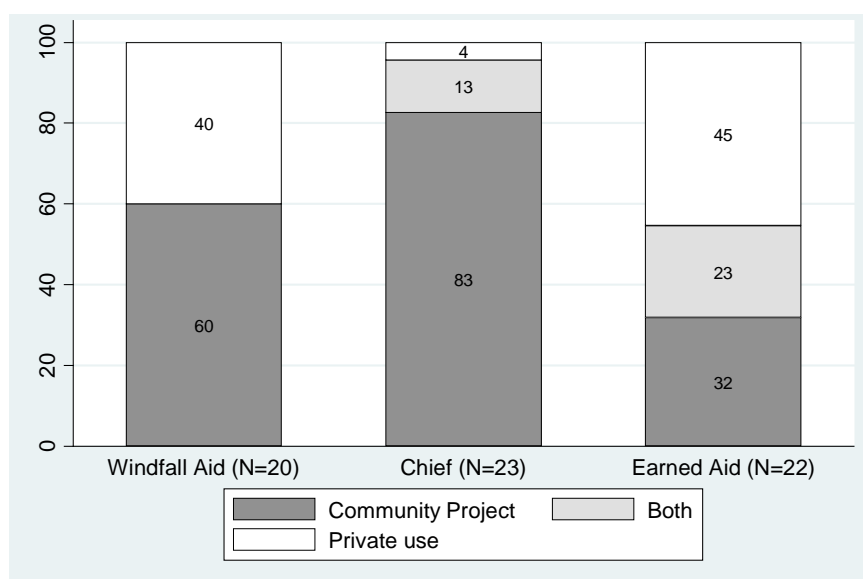
Note: numbers in graphs refer to column percentages.

As part of the endline village survey we assessed (if applicable) what type community project was created (Figure 7a). Three types of community projects were typically selected: building or rehabilitating the court *barri* (a community structure for meetings), a guesthouse, or a mosque. We then looked at the completeness of the project. Research assistants visited the project and assessed whether it was mostly completed, nearly completed or whether there were at all any signs of a project (nearly nothing). Under windfall aid (through chief or to households directly) the community project is more likely to be (almost) finished (Figure 7b). This is dramatically lower under the earned-aid condition.

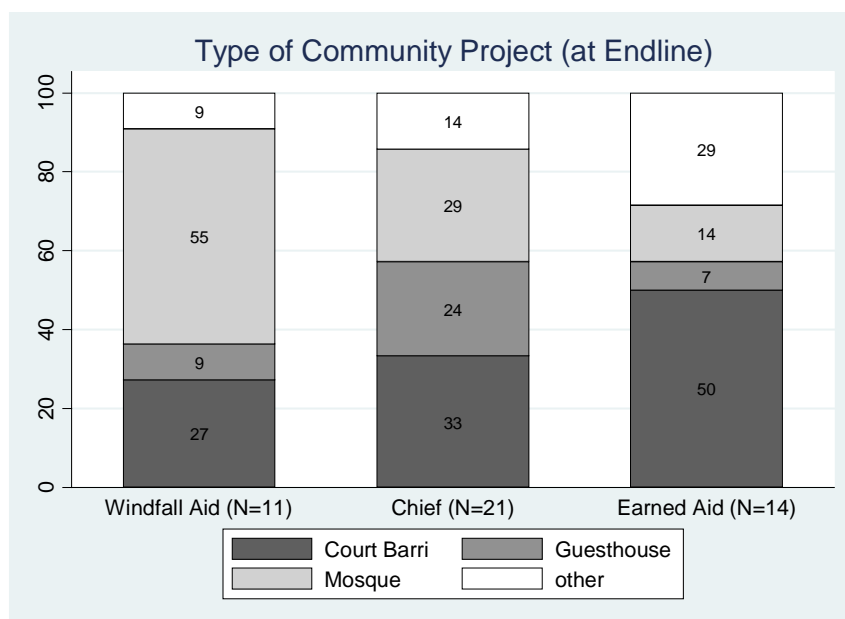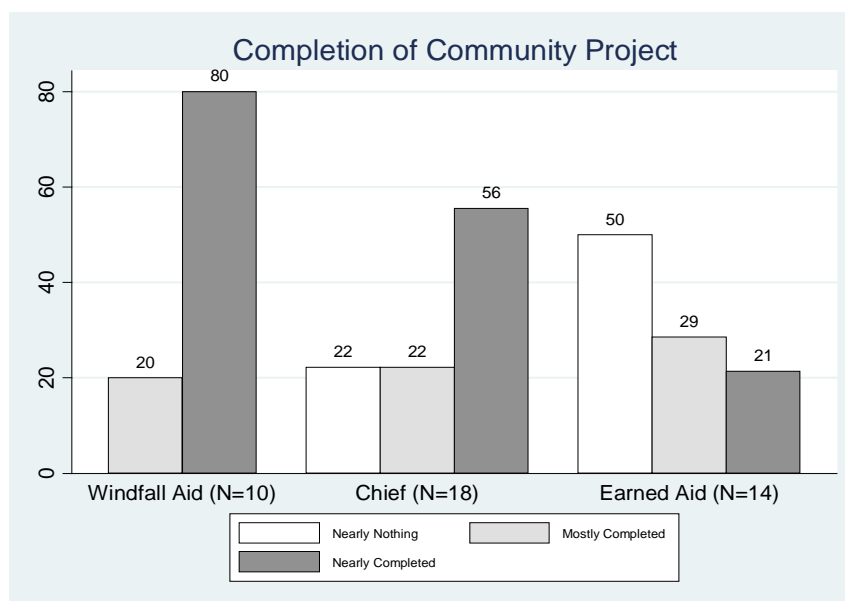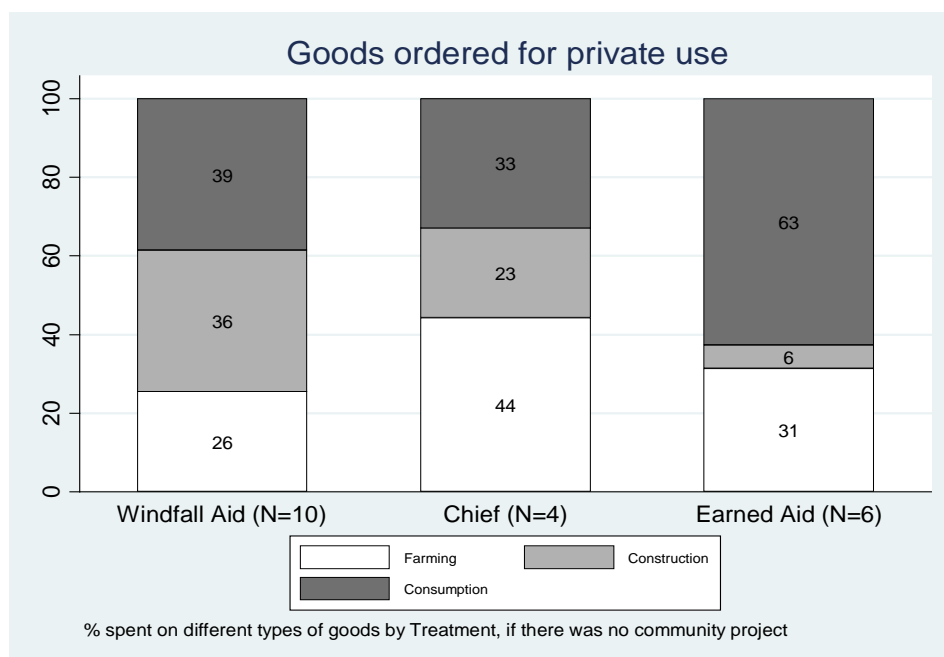**Figure 7a: Type of project and completeness – by endline**

Type of Community Project (at Endline)

Figure 7b: Type of project and completeness – by community project

Completion of Community Project

Note: numbers in graphs refer to column percentages. The analysis is limited to the villages that allocated aid to community projects.

As part of the household survey, we asked respondents, if they had allocated aid to individual use, what was used for, farming, construction or consumption (Figure 8). If respondents worked for aid, more went to consumption compared to the other treatments.

Figure 8: Individual aid use

Goods ordered for private use

Windfall Aid (N=10): Farming 26, Construction 36, Consumption 39
Chief (N=4): Farming 44, Construction 23, Consumption 33
Earned Aid (N=6): Farming 31, Construction 6, Consumption 63

Legend: Farming, Construction, Consumption

% spent on different types of goods by Treatment, if there was no community project

Note: numbers in graphs refer to column percentages. The analysis is limited to the villages that allocated aid to individual use.

6.8   Aid impacts

Next, we looked at the individual impacts on economic, social and conservation indicators. In Tables 6–9 we present the main results across economic, social and conservation indicators corresponding to model (1) above. The coefficients in the tables represent standard deviation changes with respect to the control group. Table 6 reports our results on a main indicator per each subgroup of outcomes (economic, social and conservation outcomes) and Tables 7–9 provide details for each family of outcomes per subgroup.

Across the columns and tables, the coefficient on our treatment dummies is small and mostly insignificant. However, the p-values testing the difference between or treatments are significant for economic outcomes in Table 6. This is however not confirmed by the results in Tables 7a and 7b.

Table 6: Overall impacts

	(1) Economic Outcomes	(2) Social Outcomes	(3) Conservation Outcomes
T1: Windfall aid	0.071	0.065	0.244
	(0.110)	(0.100)	(0.202)
T2: Chief	0.081	-0.001	0.086
	(0.104)	(0.084)	(0.183)
T3: Earned aid	-0.086	0.070	-0.165
	(0.095)	(0.098)	(0.139)
Constant	0.000	0.000	-0.000
	(0.080)	(0.073)	(0.096)
p-value T1 vs T2	0.923	0.413	0.507
p-value T1 vs T3	0.088	0.959	0.048
p-value T2 vs T3	0.052	0.361	0.180
N	2251	2251	2251

Robust standard errors in parentheses clustered at village level.

Table 7a: Economic outcomes, part 1

	(1) E1 Farm income (log)	(2) E2 Work income (log)	(3) E3 Other income (log)	(4) E4 Productive assets	(5) E5 Other assets	(6) E6 Farm size	(7) E7 Farm productivity	(8) E8 Hours work
T1: Windfall aid	-0.021	-0.048	0.075	0.108	0.073	-0.057	0.102	-0.160*
	(0.087)	(0.086)	(0.093)	(0.066)	(0.133)	(0.103)	(0.128)	(0.086)
T2: Chief	-0.011	0.007	0.047	0.004	0.116	0.014	0.050	-0.026
	(0.098)	(0.070)	(0.088)	(0.071)	(0.124)	(0.103)	(0.106)	(0.093)
T3: Earned aid	-0.061	-0.009	-0.090	-0.085	-0.043	-0.119	0.064	-0.093
	(0.080)	(0.072)	(0.084)	(0.072)	(0.111)	(0.092)	(0.110)	(0.076)
Constant	0.000	-0.000	0.000	-0.000	0.000	-0.000	0.000	0.000
	(0.057)	(0.053)	(0.066)	(0.051)	(0.090)	(0.081)	(0.062)	(0.064)
p-value T1 vs T2	0.919	0.504	0.747	0.112	0.739	0.436	0.714	0.133
p-value T1 vs T3	0.646	0.639	0.051	0.004	0.331	0.421	0.791	0.344
p-value T2 vs T3	0.607	0.817	0.083	0.211	0.141	0.089	0.915	0.394
N	2209	2192	2246	2251	2251	2230	2121	2241

Robust standard errors in parentheses clustered at village level. * $p < 0.10$,

Table 7b: Economic outcomes, part 2

	(1)	(2)	(3)	(4)	(5)	(6)
	E9 Effort AFE	E10 Agricultural loan	E11 Consumption loan	E12 Saving	E13 Myopic AFE	E14 Change in Inequality
T1: Windfall aid	0.026	-0.034	-0.103	0.113	-0.072	0.159
	(0.093)	(0.088)	(0.067)	(0.086)	(0.085)	(0.167)
T2: Chief	-0.076	-0.046	-0.028	0.030	-0.024	0.110
	(0.089)	(0.081)	(0.055)	(0.085)	(0.069)	(0.169)
T3: Earned aid	-0.088	-0.096	0.009	0.106	-0.091	0.169
	(0.091)	(0.083)	(0.073)	(0.089)	(0.077)	(0.169)
Constant	-0.000	-0.000	-0.000	0.000	-0.000	-0.000
	(0.063)	(0.063)	(0.049)	(0.057)	(0.051)	(0.133)
p-value T1 vs T2	0.273	0.885	0.144	0.362	0.567	0.733
p-value T1 vs T3	0.230	0.458	0.112	0.939	0.827	0.945
p-value T2 vs T3	0.895	0.505	0.527	0.418	0.369	0.686
N	2099	2251	2251	2247	2118	2245

Robust standard errors in parentheses clustered at village level.

Table 8: Social outcomes

	(1) S1 Trust	(2) S2 Food sharing	(3) S3 Honesty perception	(4) S4 Village level: Honesty AFE	(5) S5 Contribution to Public Goods	(6) S6 Chief Quality	(7) S7 Number of conflicts	(8) S8 Respondent Selfish, based on AFE
T1: Windfall aid	0.061	0.038	0.085	0.311	0.060	0.021	-0.068	0.036
	(0.103)	(0.124)	(0.070)	(0.344)	(0.186)	(0.114)	(0.108)	(0.140)
T2: Chief	-0.021	0.014	$0.109^{Ü}$	0.156	0.085	0.006	-0.120	-0.026
	(0.083)	(0.126)	(0.071)	(0.280)	(0.105)	(0.105)	(0.105)	(0.123)
T3: Earned aid	0.085	0.114	0.116^{*}	0.555	0.138	-0.089	-0.102	-0.032
	(0.089)	(0.135)	(0.064)	(0.347)	(0.125)	(0.116)	(0.115)	(0.131)
Constant	-0.000	-0.000	0.000	0.000	0.000	-0.000	0.000	-0.000
	(0.064)	(0.100)	(0.052)	(0.213)	(0.068)	(0.088)	(0.098)	(0.098)
p-value T1 vs T2	0.391	0.819	0.726	0.636	0.897	0.873	0.394	0.620
p-value T1 vs T3	0.817	0.520	0.611	0.529	0.699	0.300	0.654	0.608
p-value T2 vs T3	0.194	0.402	0.906	0.229	0.685	0.324	0.804	0.958
N	2248	2246	2250	90	2250	2161	2137	2156

Robust standard errors in parentheses clustered at village level. * p < 0.10

Table 9: Conservation outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	C1 Hunting, Logging and Mining in Community Forest	C2 Allow Illegal activities in GRNP	C3 Should have conservation association in village	C4 Healthy Community Forest is important	C5 Healthy GRNP is important	C6 I like the GRNP	C7 Dictator game GRNP	C8 Willingness of village to cooperate with FFE	C9 Quality of land for FFE
T1: Windfall aid	0.276	0.005	0.058	-0.064	0.072	0.084	0.116	-0.944**	0.911
	(0.245)	(0.062)	(0.149)	(0.131)	(0.111)	(0.078)	(0.126)	(0.430)	(0.998)
T2: Chief	0.314	-0.042	-0.124	-0.150	-0.167	-0.123	0.031	-0.577	-0.073
	(0.227)	(0.042)	(0.154)	(0.115)	(0.141)	(0.106)	(0.121)	(0.471)	(0.309)
T3: Earned aid	-0.059	-0.001	-0.127	-0.166	-0.198	-0.166	0.101	-1.086**	-0.148
	(0.149)	(0.059)	(0.147)	(0.113)	(0.133)	(0.101)	(0.127)	(0.479)	(0.340)
Constant	-0.000	0.000	-0.000	0.000	0.000	-0.000	0.000	0.000	-0.000
	(0.117)	(0.042)	(0.106)	(0.061)	(0.083)	(0.058)	(0.086)	(0.213)	(0.225)
p-value T1 vs T2	0.895	0.306	0.238	0.570	0.082	0.047	0.501	0.516	0.326
p-value T1 vs T3	0.155	0.927	0.209	0.495	0.037	0.012	0.907	0.803	0.295
p-value T2 vs T3	0.086	0.308	0.984	0.908	0.843	0.724	0.584	0.399	0.822
N	2242	2249	2250	2250	2250	2250	2143	91	69

Robust standard errors in parentheses clustered at village level. ** $p < 0.05$, *** $p < 0.01$

7. Discussion

Our results show that the way in which aid is distributed—communal versus individual, and windfall versus earned—has a significant effect on how it will be used. Our study shows that aid given through local institutions was more likely to be discussed in a public meeting and more likely to be used for public goods. Over time, the share allocated to community projects increased in the windfall-aid villages, but reduced in the villages where aid was earned.

This may indicate that people who work for aid feel proprietorial about it and over time are better able to resist social pressure to put the aid to collective use. Under windfall aid (through chief or to households directly) the community project is more likely to be (almost) finished. We found this to be dramatically lower under the earned-aid condition. This may point to the strong sense of entitlement individuals feel over aid that they worked for. The social contract that motivates community members to help provide public goods is undermined by a sense of proprietorial claim over aid, when it is earned by individuals. In our study we found that funds devoted to personal use were more likely to be spent on consumption goods than on farming or construction inputs, goods that were likely to pay out longer-term benefits.

Effects at the household level seemed to be minimal. There were few significant differences across treatment and control groups for the indices we created, including economic, social, and conservation outcomes. This may in part be explained by the high sense of community we found in these villages, with over 60 per cent of aid being allocated to community projects. This significantly dampens the potential individual-level impacts when much of the aid is spent on a community project. In addition, perhaps the per capita amount of aid (USD 15) may have been too low to impact households significantly. Finally, given the small sample, the null results may reflect low statistical power rather than a lack of relative change in outcomes.

We were able to monitor the implementation of this intervention to ensure that there was no contamination or attrition. The intervention was done at the village level and all villages started and completed their assigned treatment program. All of the treatments were somewhat new to the area. The partner organization had been distributing block grants to local leaders in the area for 10 years, but this is the first time money was distributed to local leaders and individuals.

The earned-aid intervention resembled a typical for-work program that is often implemented in development settings. Second, it is common for many aid agencies delivering benefits (predominantly some inputs) to communities to soliciting recipients help to work on public goods. For example, the village may be told that if they donate the labor to build and maintain a well, a charity in the area will pay for the pump and the drilling.

The potential risk of Hawthorne effects[17] was low. All treatment groups faced similar levels of scrutiny. We must mention that villages where we used the first type of treatment (with the chief, with communal aid) felt like they should use the money for a public good, and in fact wanted to use it for individual goods, because the NGO implementer gave the money to the chief. Perhaps if the same villages made their decisions about what to do in a vacuum, without monitoring by a foreign aid organization, they would have been happier to devote more of the resources to individual projects.

While such bias can never be ruled out completely, we believe the risks for our study were minimal. First, we took care to always introduce the team as a separate entity of the implementing agency. Second, we have a longer track record for doing research in the area, contributing to this separate identity. More importantly, we do not see any direct link between such bias and treatment status.

We cannot rule out spillovers completely. Given that treatments were randomized at the village level without taking spatial or political variation into account, allowed for the possibility that villages in one treatment in our sample were aware of other villages in the other treatments, or that benefits received in one treatment were shared with other villages. Given the low sample size and the absence of treatment effects we have not engaged in a spillover analysis.

We do not think social desirability bias (the tendency for respondents to over-report satisfaction) or courtesy bias (the tendency to underreport dissatisfaction) impacted our results, but we cannot rule out a bias completely. There is a chance, reported attitudes about conservation, for example, were higher in project areas because people interacted more with the NGO and felt they should support conservation. When considering the external validity of our results, we have to be cautious. These interventions were designed to test the effect of conditionality and communality in aid, and may not be optimal policies in themselves. It is striking that none of the three treatments led to significantly better economic, social or conservation outcomes, although the comparison was low powered.

These results match the recent literature that has come out in support of unconditional cash transfers. We also find that the unconditional groups do well, and even the unconditional individual transfers lead to better public good provision and more expenditure on investment goods than consumption goods. The field staff of the NGO and the researchers expected the conditional program to lead to better results, and was surprised by that outcome.

It is possible that with larger treatment groups we could have differentiated between treatment groups across more of the outcomes we tracked. It may be worth investing in doing a larger study. Because so much work has now been done on unconditional transfers, a more promising route for future research would be to explore the welfare

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[17] Hawthorne effect also called the observer effect refers to the modified or altered behavior seen in respondents as a result of the realization

implications of inducing people to use windfall resources more for public goods, private consumption goods, or private investment goods.

8. Specific findings for policy and practice

International conservationists increasingly use transfers to promote both livelihoods and nature conservation. The main advantage of such transfers is that they are uncontroversial and popular among recipients, easy to deliver and scale-up (provided sufficient funding is available), and hold the promise of killing multiple birds with one stone—promoting conservation and improving the livelihoods of some of the poorest people on the planet. However, the impact of unconditional transfers is an empirical matter, and likely something that varies from one locality to the next.

Unfortunately, assessing the empirical basis for claims that unconditional payments schemes promote conservation is very difficult. In the absence of exogenous variation in transfers, selection effects introduced by choices of either the donor or recipient threaten the validity of identification strategies. While difference-in-difference approaches, the leveraging of (exogenous) variation in the roll-out of payments schemes or the introduction of instrumental variables can go a long way towards attenuating such concerns (Blackman 2012), additional assumptions on time-variant unobservables would be required. To our knowledge, this is the first study that used an RCT and leverages identification from variation in transfers that is exogenous by design.

In this project, we implemented three versions of a transfer program in 91 rural communities dependent on slash and burn agriculture. One version provided aid unconditionally to the household, one as unconditionally aid to the chief to distribute as he saw fit within the community, and one as an aid-for-work program that made household transfers conditional on supplying labor. We compared outcomes across a range of social, economic and land use indicators.

We find that the way in which aid is distributed has a significant effect on how the aid will be used. Conditional aid to the individual is going to lead to more consumption with little attention given to public goods. Unconditional aid to the community is going to lead to more public goods that are better managed.

In terms of impact on households' livelihoods and support for conservation, our results are sobering. We find no significant impacts on economic, social and conservation outcomes. Subsequently, we can only draw limited lessons for policymakers, key influencers, or implementers who need to know about mechanisms and behavioral bottlenecks. If you take our null results at face value, it would imply that the most cost-effective way to implement a livelihood support program in rural villages is to make unconditional transfers (so that you do not have to spend any resources on monitoring or verification) at the village level (so that you save labor costs by not requiring field staff to visit every household). Organizing the work projects that allowed participants to earn livelihood support took significant time and there is limited evidence it created some ill will.

These results should be informative to a policymaker who is trying to decide how to implement a livelihood support program. It sheds light on the trade-offs the policymaker must weigh when designing such a program. We hope this research project leads to more understanding and more research on the social dimension of aid dispersion.

Appendix A: Additional tables

Table A1: Power calculations (MDE) based on baseline variables

Name	Mean	SD	MDE	% difference at mean
Tin roof?	0.35	0.48	0.14	41.83
Mobile phone?	0.13	0.34	0.10	79.02
Do you hide your harvest?	0.62	0.49	0.15	24.09
# HHs you share with	3.42	2.83	0.86	25.25
Are people honest?	0.91	0.29	0.09	9.74
Is inequality changing?	1.90	0.77	0.24	12.40
Do you attend community meetings?	0.90	0.29	0.09	9.93
Is your chief good?	0.89	0.31	0.10	10.79
# times won in coordination game	1.59	1.09	0.33	20.94
Egalitarian type, sharing game	2.67	1.57	0.48	17.96
Point where respondent switched something for nothing	2.90	1.58	0.48	16.62
Point where respondent switched time preference game	3.93	2.19	0.67	16.95
Hours worked per day	5.57	1.79	0.55	9.81
# of bushels rice harvested this year	3.92	2.54	0.77	19.74
# palavas with other HH last month	0.35	0.64	0.20	55.91
# asked chief for help last month	0.86	1.05	0.32	37.20
# times worked on community project last month	2.29	1.49	0.45	19.82
# community meetings attended last month	2.48	1.58	0.48	19.37

Notes: We assume for I = 1, ..., 30 respondents per village and j = 1,.., 23 villages per treatment arm. Based on earlier work we assume rho = 0.1.

Table A2: Mean household and respondent characteristics by attrition status

Panel A: Attrition level (overall 33%)							
	Originals			**Drop out**			
	obs	**mean**	**se**	**obs**	**mean**	**se**	**p-value**
IS3: How old are you?	1578	39.56	0.36	764	38.40	0.52	0.19
IS4: Male	1597	0.60	0.01	776	0.61	0.02	0.91
IS5: Tin roof?	1581	0.35	0.01	771	0.34	0.02	0.37
IS6: Mobile phone	1575	0.12	0.01	767	0.15	0.01	0.00
IS8: Hours per day work	1591	5.98	0.06	773	5.82	0.08	0.73
IS9: Bushels of rice	1563	5.34	0.13	754	5.12	0.23	0.97
IS12: #HHs share with you	1576	2.80	0.04	766	3.07	0.14	0.08
IS14: People honest?	1598	0.92	0.01	776	0.87	0.01	0.00
IS20: Chief good?	1534	0.90	0.01	764	0.87	0.01	0.37
IS29: Work on community projects	1593	2.83	0.06	776	3.02	0.09	0.38

Note: Error terms clustered at the village level, weighted for likelihood to be treated.

Table A3: Regression results attrition

	(1) Original household (dummy)
IS3: How old are you?	0.000635
	(0.00267)
IS4: Male	0.000700
	(0.0613)
IS5: Tin roof?	0.0708
	(0.113)
IS6: Mobile phone	-0.227**
	(0.0898)
IS8: Hours per day work	0.0208
	(0.0169)
IS9: Bushels of rice	0.00312
	(0.00692)
IS12: #HHs share with you	-0.0434**
	(0.0211)
IS14: People honest?	0.394***
	(0.134)
IS20: Chief good?	-0.0527
	(0.123)
IS29: Work on community projects	-0.0123
	(0.0136)
Constant	-0.136
	(0.188)
Observations	2,128
Adjusted R^2	
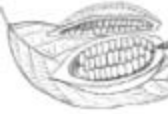
Table reports probit regression on dummy 1 if present in both baseline and endline. Standard errors in parentheses, clustered at village level, weighted for likelihood to be treated.

$* \ p < 0.10, \ ** \ p < 0.05, \ *** \ p < 0.01$

Appendix B: Endline record sheets

Table A4: Menu of goods

	Description of goods		Price (Le)
01	PALM OIL (PINT)		**1,200**
02	SALT (BUTTER CUP)		**500**
03	SUGAR (BUTTER CUP)		**1,500**
04	MAGGI (PKT)		**12,500**
05	MAMPO - SANDEGE (PKT)		**6,500**
06	RICE (BUTTERCUP)		**800**
07	RADIO		**75,000**
08	RUBBER BOWL (MEDIUM)		**12,000**
09	HOE (BIG)		**15,000**
10	HOE (SMALL)		**5,000**
11	BRUSHING KNIFE		**5,000**

12	UPLAND CUTLASS		10,000
13	UPLAND SEED RICE (BUSHEL)		40,000
14	IVS SEED RICE (BUSHEL)		60,000
15	CASSAVA STICKS - IMPROVED (BUNDLE, 30)		10,000
16	COFFEE SEEDLING		2,500
17	CACAO SEEDLING		2,500
18	OIL PALM SEEDLING - IMPROVED		10,000
19	GOAT HAMMER		8,000
20	FERTILIZER NPK 15/15 FOR RICE (BAG)		115,000
21	FERTILIZER NPK 20/20 FOR COCOA + COFFEE (BAG)		115,000
22	FERTILIZER UREA FOR RICE + COCOA + COFFEE (BAG)		115,000

#	Item		Price
23	SAW		50,000
24	HEAD PAN		23,000
25	PICKAXE		26,000
26	SEWING MACHINE		320,000
27	SHOVEL		28,000
28	CEMENT (BAG)		40,000
29	ZINC SHEET (BUNDLE)		280,000
30	ZINC SHEET		15,000
31	IRON ROD (1/2 INCH, 40 FT)		48,000
32	IRON ROD (1/4 INCH, 40 FT)		12,000
33	PVC PIPE (40 FT)		52,000
34	PVC ELBOW/ T		12,000

35	ROOFING NAIL (PKT)		25,000
36	NAILS 4" (PKT)		9,000
37	NAILS 3" (PKT)		9,000
38	WATER TANK (1000 L.)		1,300,000
39	WATER TANK (500 L.)		800,000
40	GENERATOR – 3KV		1,300,000
41	GENERATOR – SMALL, BETTER THAN TIGER		600,000

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This study measures the impact of a cash transfer programme aimed at alleviating poverty and reducing pressure on the natural environment in Sierra Leone. Researchers implemented three versions of cash transfers in 91 rural communities, which are dependent on slash-and-burn agriculture. They offered aid as windfall transfers; asked chieftains to distribute aid; and also conducted an aid-for-work programme.

The study concludes that the manner in which aid is distributed – communal versus individual and windfall versus earned – has a significant effect on how the aid will be used. Earned aid given directly to individuals leads to more consumption with little attention given to public goods. Windfall aid given to community leaders leads to more public goods that are better managed. Researchers however found no significant impact on economic, social and conservation outcomes.

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