Resettlement and Climate Change Adaptation in Rwanda: The Case of Rweru Model Green Village

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Abstract

Climate change adaptation policies frequently aspire to improve the adaptive capacity of communities facing risk. Rwanda's rural resettlement policies go even further, connecting economic growth, poverty reduction, climate change adaptation, and environmental protection objectives. Rweru Model Green Village in the Eastern Province embodies these mutually beneficial pillars of the Integrated Development Program. This pilot research sought to understand and evaluate the case of Rweru through qualitative social science methods, including semi-structured interviews with relocated households. Findings suggest that overall, Rweru has succeeded in relocating families away from high-risk locations, and the village offers a range of social protection and infrastructure advantages to residents. Persistent challenges include low agricultural productivity, inconsistent water availability, and difficulty securing and maintaining access to credit, land titles, and off-farm employment. Thus, the question of whether rural resettlement in Rwanda drives improvements in adaptive capacity remains murky, and further research is necessary.

Keywords

Planned relocation; disaster risk reduction; capacity-building; climate change; Rwanda

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1. Introduction

Impacts from climate change, including rising global temperatures, erratic precipitation, and increasing natural disasters, are placing millions of households at risk world-wide. The relative ability of a community to cope with these risks is captured in the concept of adaptive capacity; the term includes both direct coping strategies like water management policies and indirect factors, like the relative strength of social cohesion. Building institutional pathways to enhance adaptive capacity is one way to frame the critical work of climate change adaptation for governments. Across rural Africa, where durable poverty and limited infrastructure are prominent, many subsistence farmers face a direct threat to their livelihoods. Socially and financially vulnerable, those farmers are highly exposed to climate change induced hazards and tend to have very low adaptive capacity.

When risk exceeds adaptive capacity, households have few viable options. They may migrate to safer settings voluntarily, although many such households likely lack the available capital to support such a move. They may be subjected to mandatory resettlement by government. In either scenario, the disruptions associated with moving have historically led climate-induced migration to be seen as an undesirable outcome, representing a failure of adaptation.[1] However, a growing body of literature has explored whether such movements might be seen instead as an effective adaptive response to the range of impacts associated with climate change.[2] In an effort to improve climate migration outcomes, an international web of institutions has emerged, linking long-standing governance structures in migration with those in climate change.[3] For example, the Nansen Initiative on Disaster-Induced Cross-Border Displacement (2012), the Sendai Framework for Disaster Risk Reduction (2015), and state-level National Adaptation Plans have sought to measure, project, and guide climate change related movements. Regional efforts such as the Africa Mobility Initiative, which builds upon the 2009 African Union Convention for the Protection and Assistance of Internally Displaced Persons in Africa (The Kampala Convention), have also emerged, seeking to bring together actors from civil society, the private sector, and government to address challenges that take place within and spill over state lines.

Rwanda is a compelling case for research into climate change policy. The country is considered carbon negative and has contributed less than 0.01% of current concentrations of greenhouse gases in the atmosphere.[4] Climate mitigation efforts, including improved energy efficiency and a transformed grid, are strong, and the city of Kigali is widely hailed as one of the most environmentally sound urban areas in the region.[5] Robust policy documents such as the Green Growth and Climate Resilience Strategy (2011), reflect the government's commitment to a clean energy future and a green development pathway.

[1] Mach, K. and A.R. Siders, 2021. Reframing Strategic, Managed Retreat for Transformative Climate Adaptation. *Science* 372 (6548): 1294-1299

[2] McAdam, J. and E. Ferris. 2015. Planned Relocations in the Context of Climate Change. *Cambridge Journal of International and Comparative Law* 4(1): 137-167

[3] Rigaud, K. et.al. 2018. *Groundswell: Preparing for Internal Climate Migration* World Bank: Washington, D.C.

[4] Global Carbon Project. 2020. Supplemental data of Global Carbon Budget

[5] Bafana, Busani. 2016. Kigali Sparkles on the Hills. *Africa Renewal*: April, 2016

But Rwanda also ranks as one of the most vulnerable countries in the world to the effects of climate change. With 80% of its residents reliant on rain-fed subsistence agriculture for survival, climate adaptation is an urgent matter for policy-makers. As the most densely populated country in Africa, Rwanda's smallholder farmers rely on less than 0.5 hectares per household. Erratic rainfall, drought and landslides threaten rural livelihoods, impact Rwanda's export market for tea and coffee, and destabilize hydropower, responsible for half of its electricity generation. In 2018, Rwanda was ranked the 8th (out of 196) most impacted by climate change in the world, and the 29th most vulnerable country.[6]

At the root of Rwanda's risk from climate change is the nexus where natural hazards meet vulnerable populations. Despite decades of robust economic growth – Rwanda's GDP per capita grew at a 14% rate from 2014-2017 – poverty in Rwanda is a persistent challenge. The most recent data shows total poverty in Rwanda to be 38.2%;[7] that poverty is disproportionately prevalent in rural areas. Indeed, 82.2% of the total population is rural, but 93% of Rwandan's poor people live in rural areas. So fragile are those livelihoods that scientists expect up to 3 million people to leave Rwanda's countryside as impacts from climate change accelerate.[8] Rwanda's development and planning policies envision a shift away from subsistence agriculture to a market oriented, knowledge-based economy. To accomplish this overhaul, the Government of Rwanda (GoR) has prioritized poverty reduction, decentralized governance, and social protection across a wide range of domestic initiatives. Still in progress, the country's National Adaptation Plan will tie some of these policy goals more explicitly to international climate change adaptation governance. Building *adaptive capacity* – understood as the relative ability of a community to adapt to a changing climate – is an embedded goal in Rwanda's sustainable development.

This research probes the effectiveness of one strategy – resettlement – as a tool for accomplishing these complex and inter-connected goals.

2. Resettlement: Policy Context

Rwanda's colonial history laid the groundwork for the devastating Genocide Against the Tutsis in 1994. In the aftermath of that national devastation, millions of people returned to Rwanda, and the country began the process of rebuilding. The development model described in Rwanda's seminal *Vision 2020* specifies the creation of rural settlements as a way to give vulnerable families a pathway out of extreme poverty. The *Economic Development and Poverty Reduction Strategy (EDPRS)* and the *National Strategy for Transformation (NST1)* echo this vision, noting that rural settlements can create access to economic opportunities, off-farm jobs, and social protection alongside basic services. Targeting a rural poverty rate of 20%, the policies share a goal to have 70% of households in rural areas in viable planned settlements by 2020. Part of this strategy prioritizes the resettlement of households in high-risk zones, particularly those at risk of landslides and flooding.

[6] Notre Dame Global Adaptation Initiative (ND-GAIN), 2021
[7] National Institute of Statistics Rwanda, Rwanda Integrated Household Living Conditions Survey 6: 2019-2020 (EICV6)
[8] Amakrane, Kamal, et.al. 2023. African Shifts: The Africa Climate Mobility Report: New York, p. 21

The Human Settlement Policy (HSP) known as *imidugudu* ("blocked settlement") was established in 1996 to "villagize" scattered rural landscapes through grouped settlements, touted as a way for the government to concentrate service and infrastructure delivery, support social cohesion, and simultaneously free up unoccupied land for more efficient agricultural use, reduced soil erosion, and environmental protection. As part of the HSP, Rwanda adopted the Rural Settlement Program in 2008 to reach poor rural residents living in thatched houses,[9] encouraging them to move voluntarily into more stable and higher quality *imidugudu*, defined as 100-200 houses grouped together through planned settlements in rural areas, covering a total of 10-20 hectares.[10] Early planned villages were showcased as *model villages* and provided templates for district leaders to adopt as they follow national guidance to emulate the model.

Agricultural and land use policies also support resettlement. The *Crop Intensification Program* (CIP) (2007) was designed to improve agricultural efficiency through land use consolidation, provision of extension services to rural farmers, distribution of inputs like fertilizer and seeds, and enhanced post-harvest capacity through storage and processing. The *Land Use Consolidation* (LUC) component of the CIP was implemented in 2008, encouraging farmers to combine their small plots into larger fields for cooperative management, while retaining individual ownership. Preliminary evidence suggests that these policies have resulted in higher yields, better access to inputs and improved food security.[11]

Social protection and local governance efforts provide additional support for reconfiguration of the rural landscape. Awarded the United Nations Public Service Award in 2008, Rwanda's *Ubudehe Program* is a national approach for poverty reduction that categorizes households to facilitate interventions. The poorest households, defined as landless and consistently food insecure, are eligible for extra support through social protection programs. The Vision 2020 Umurenge Program (VUP) was introduced in 2008 to link donor support with poverty reduction and public works; by 2014, that program had reached 13% of the poorest Rwandans through wages for public works.[12] One of the most popular forms of social protection allocated through *ubudehe* is the *Girinka Program*, where poor families are given a cow, seen as a way to provide not just nutritional benefits from milk consumption, but financial stability and a sense of personal dignity.

Combining poverty reduction, resettlement, and environmental protection goals gave way to the notion of a *green village*. Two pilot model green villages established in 2011, one in Rubaya and one in Muyebe, were deemed successful and worthy of replication.[13] Those villages

[9] A prohibition on thatched houses was also imposed through the "Bye-Bye Nyakatsi" program in 2010.
[10] Ministerial Order No.001/07.05, May 2009
[11] Ngoga, Thierry. 2015. Rural Settlement in Rwanda: An Assessment of Land Management and Livelihoods. International Alert and USAID; Knox, Kate, et.al., 2014. Assessment of the Economic, Social and Environmental Impacts of the LUC Component of the CIP Program in Rwanda. USAID; Habyarimana, John Baptise, at.al. 2017. Policy Reforms and Rural Livelihoods Sustainability: Challenges and Opportunities. *African Development Review* 29: 96-108.
[12] Lavers, Tom. 2016. Understanding Elite Commitment to Social Protection: Rwanda's Vision 2020 Umurenge Programme. WIDER Working Paper #093.
[13] REMA, Green Village Toolkit, UNDP-UNEP Poverty Environment Initiative; Maradan, D. 2017. Assessment of the Economic, Social and Environmental Benefits of the Rubaya Green Village in Gicumbi District.

demonstrated the ways consolidating households into planned settlements through *imidugudu* makes it possible to deliver infrastructure and other services while at the same time protecting ecosystems. Prioritizing local materials and using low carbon building strategies, such as clay for bricks instead of wood, are some of the key principles guiding model green villages. Shared cowsheds create opportunities for integrating biogas production and distribution systems among households in the green villages, and that fuel source allows farmers to reduce their dependence on fuelwood for energy, thereby protecting nearby forests. Accessible drinking water in the new villages frees up hours of time for kids who can then go to school.

The *Integrated Development Program* (IDP) connects many of these strands – including resettlement, poverty reduction, and economic growth -- under one heading. Eleven pillars of the Integrated Development Program model reflect the ways each attribute is connected to the others: land productivity, post-harvest processing and marketing, cooperative development, off-farm employment, promotion of micro-finance and insurance, voluntary resettlement, rehabilitating ecosystems, social protection, infrastructure development, promotion of Information and Communications Technology (ICT), and leadership development. The program has resettled an estimated 61,890 families nation-wide since 2017,[14] with the vast majority of those families placed into newly built model villages, some of them deemed 'green'. Today there are 14,815 villages in Rwanda, and 67.5% of rural Rwandans are housed in *umudugudu* settlements.[15]

Despite the ubiquity of this rural transformation in Rwanda, research on the effectiveness of the resettlement policy is scarce. Overall, the studies that exist have given the Integrated Development Program satisfactory reviews.[16] But they have also pointed to persistent challenges in the early model villages. Sustained low capacity in vulnerable households, difficulty with mindset transition to self-directed village life, and failure to secure off-farm employment are some of the most prominent critiques.[17] Resettlement is difficult for many families.

3. The Case of Rweru

Rweru Model Green Village is located in Bugesera District in the Eastern Province, a region where 79.3% of households work in farming, either on their own land or as wage laborers.[18] The Eastern Province is relatively flat compared to the rest of the country, and therefore less prone to the risk of landslides; however, within the province, Bugesera District faces the highest risk for floods, due to the Nyabarongo River overflowing its banks without a reliable drainage system.[19]

[14] Karuhanga, James. Rwanda on Course to Relocate All Citizens from Poor Housing. *New Times*, 1/11/2020.
[15] Rwanda Ministry of Infrastructure, 2021.
[16] Ngoga, Thierry. 2015. Rural Settlement in Rwanda: An Assessment of Land Management and Livelihoods. International Alert and USAID; Muganwa, David. 2013. Support for the Rwanda Integrated Development Initiative: Final Evaluation Report. UNDP / GoR.
[17] Isaksson, 2013. Manipulating the Rural Landscape: Villagisation and Income Generation in Rwanda. *Journal of African Economies* 22(3): 394-436; Janet Umugwaneza, REMA, personal interview, 2021.
[18] Rwanda National Institute of Statistics, 2018. The 5th Integrated Household Living Conditions Survey, EICV5.
[19] Government of Rwanda, 2012. High Risk Zones report.

Prior to relocation, an estimated 2,000 people lived on nearby Mazane and Sharita islands in Lake Rweru on the Burundi border. Those islands were home to generations of Rwandans, but with few modern services and rising risks from floods, they were seen as exposing the inhabitants to hazards and limiting livelihood options. Residents faced a two-hour journey by canoe to reach markets, health care, and secondary schools. Drinking water came from the lake, and this unfiltered source led to persistent health problems for residents.[20]

In 2016, the Rweru Model Green Village was inaugurated to provide new housing for families who faced a mandatory resettlement order from the islands. Resettlement in Rweru occurred in four distinct phases between 2016-2020, each one keeping pace with availability of newly built houses in the village (see Photos 1 and 2). At the time of this field research (June 2021), 1777 individuals in 296 households were living in Rweru. Nobody remains in Mazane, and indeed visitation to that island is prohibited; however, 331 households are still in Sharita awaiting resettlement, and relocated families retain some access to their former croplands. So far, a total of 178 cows have been given to the relocated households, and they are cooperatively managed in shared cowsheds (see Photo 3). Local schools include primary, secondary, and vocational programs, all either on site in Rweru or nearby in the Sector. A new health care center sits in the center of the village (see Photo 4). The newest homes in Rweru are in the 4-in-one model, with four families housed in the same structure, designed to maximize efficient land use.

Rweru residents are in the poorest *ubudehe* category, defined as families without a home and unable to support themselves; having lived only in a remote island setting, they face a range of adjustments to village life. Pre-pandemic, residents were slowly coming together through cooperative formation, and many began to rely on newly available social services. But as the pandemic led to market closures and transportation disruption, some of those early gains were erased. This research probes these dynamics, trying to assess the extent to which the model green village creates, maintains, or reduces the adaptive capacity of its residents.

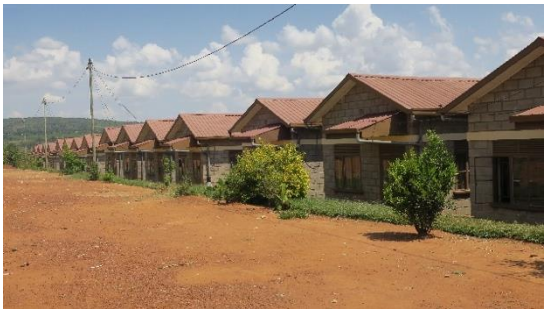

Photo 1: Phase 2 houses in Rweru

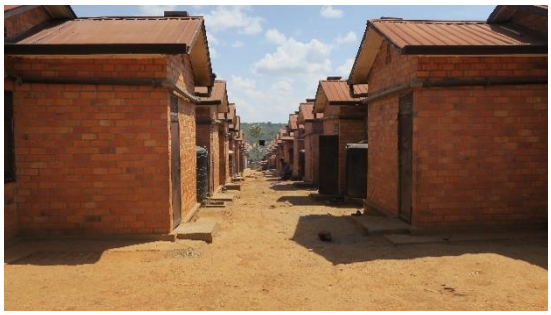

Photo 2: Phase 3 houses in Rweru

[20] UNDP, 2016. Rweru Model Green Village A Hope for a Better Life.

Photo 3: Shared cowshed in Rweru

Photo 4: Health care center in Rweru

4. Research Objectives

- Understand opportunities and barriers towards effective climate change adaptation in rural communities in Rwanda.
- Identify factors that contribute to adaptive capacity in resettlement programs.
- Identify opportunities for future, more in-depth research.
- Contribute to capacity-building in Rwanda as University of Rwanda students gain experience with research methodology and skills.

5. Methods

Envisioned as a pilot study, this small-scale research project was designed to help identify priority themes for deeper exploration in the future. Permits were obtained through the National Council of Science and Technology, and human subjects ethical clearance went through the University of Rwanda's IRB process.[21] Undertaken in partnership with local sustainable development expert John Mugabo, the field interviews were conducted by four UR post-graduate students.[22]

We used convenience and quota sampling to reach representative households from each of the four phases of development in Rweru. Thirty-eight (38) households were interviewed through semi-structured interviews, and an additional twenty-six (26) were contacted for demographic information – but not extensively interviewed – to maximize "blinding" and ensure anonymity. Interviews were recorded, and later transcribed and translated. Respondents were compensated 1,000 RWF for their time. Fieldwork was conducted on June 4, 5, and 6, 2021. Enumerators wore masks and all interviews were conducted outdoors to minimize risk from COVID-19. Photos were taken of the landscape and village, but not of respondents. English transcripts were later uploaded into Nvivo software for qualitative analysis through thematic coding.[23]

Additional expert interviews were held with key informants from government and non-governmental organizations including the World Food Program, the Rwandan Housing

[21] NCST/482/234/2021 and IRB No.173/CMHS IRB/2021
[22] Isaac Hitimana, Sandrine Uwase, Jeannette Batamuliza, and Noel Kwizera
[23] With help from Hung Jin Jin, Columbia graduate student

Authority, REMA, MINAGRI, MINALOC, FONERWA / Gicumbi team leadership, Bugesera District leadership, and Rweru Sector administration. The lead investigator conducted all of the expert interviews.

6. Findings

Demography of Rweru

Interviewers approached households in all four phases of development in Rweru, contacting a total of 64 households. The average household size of our sample was 5.14, and 30% of those households were female-headed. While most children were enrolled in the nearby primary school, respondents reported 21 % of children aged 6-12 were not currently attending school. Nearly a quarter (23%) of respondents described at least some part-time off-farm work, including selling surplus crops, although they noted that the pandemic had dried up markets, making those businesses unreliable. All of the adults we interviewed were illiterate, choosing to indicate informed consent through a thumbprint rather than their signature.

Life on the Islands (before relocating)

Interviewees painted a picture of a peaceful life with productive fields in both Sharita and Mazane islands. Fishing was a way of life and a consistent source of protein. They described growing beans, potatoes, cassava, and sorghum successfully on the islands. Even relatively impoverished households report having good food security: *"In Mazane, even on a small plot of land, we were able to achieve a high level of production."*

But respondents also described an isolated life without services: *"we were cut off from the rest of the world."* Many mentioned the lack of drinking water as a major drawback, and pointed to the lack of roads and electricity as challenges they faced. While primary school was available, children beyond their early years were unable to get to a secondary school except by dangerous boat. This *"made most of them drop out of school because of how far they were located."* Health care was conspicuously absent on the islands, and many respondents described harrowing journeys to find medical attention when sick or giving birth: *"when we were still there in Sharita, a woman could want to deliver a baby but getting a boat it takes a long time, a woman can even lose her life waiting."*

Market access was also difficult, and some respondents described threats from local wildlife, especially hippos, and malarial mosquitos. Many were afraid of drowning. Some described interactions with neighboring Burundi as threatening. *"Burundians used to visit the island, and they may assault you or kill you."*

Reasons for Relocating

A majority of respondents (76%) used the same language to indicate that they had been living in a "*high risk zone*" with most mentioning flooding as the primary risk they faced, along with the danger presented by the water surrounding the island. Some observed that residents had been

requesting the move for years and had finally been heard. Many mentioned President Paul Kagame by name, expressing gratitude and asserting that he personally was responsible for their move: "*The president of the republic; he is the one who gave the order to relocate us and encouraged those who remained to go."*

The Process of Relocating

Despite widespread support for this mandatory move, the relocation itself was stressful for many. They described a government-led process consisting of a boat journey from the island, and once on shore, transfer via vehicle. Respondents reported being able to take their belongings with them, although some noted that they left things behind because they were promised new items, especially kitchen equipment. But many were quick to point out that their most valuable possession, their land, was something they couldn't move. Some also reported having to leave livestock behind. Sensitization efforts apparently began immediately.

> *"They organized and scheduled a day for our relocation after we presented our challenges to the leaders. From there, they began to raise awareness for the relocation by telling us about the new good houses that had been built for us, as well as everything else wonderful about the village in which we would be residing, and we were happy and prepared for that."*

Life in Rweru: Advantages

Most respondents described improvements in their overall quality of life since moving to Rweru. The houses were particularly awe-inspiring, and respondents described them as the most important advantage of their new lives: *"Above all, the nicest thing I was given was the house."* They also described benefits of village life including access to clean water, markets, health care, schools, and electricity. Many also noted that this was their first opportunity to manage livestock, and their children were benefiting from access to milk. Some appreciated having a mattress for the first time and described furniture and kitchen equipment among the advantages. Transportation access was another common benefit. Most of the children who had grown up on the islands had never seen cars before; now, respondents reported satisfaction with the ease of taking a bus to visit relatives or access health care without a dangerous boat ride. Safety from both natural and human hazards was also frequently mentioned. Several (24%) spoke of the relief they felt knowing there were trusted officials in the village to protect them. Many described these amenities as combining to produce a better quality of life, reduced poverty, and enhanced dignity.

While the new agricultural plots they were given were largely disappointing (see "Challenges," below), respondents noticed that the poorest among them still gained through the move: *"Some people have benefited, particularly those who did not own homes on the island and did not have access to enough land to grow even a few beans."* Perceptions of more opportunity in Rweru were widespread: *"If you are not lazy, whatever you do, you succeed and you live a healthy life and earn financial income to sustain yourself and pay tuition fees for your children."*

Life in Rweru: Challenges

By far, the main challenge reported was increased poverty as a result of small, unproductive croplands in Rweru. Many spoke of the unrelenting sunshine and dry heat, lack of rain, increasing drought, and small plots. The majority of interviewees (55%) used the words "infertile", "unproductive" or "barren" to describe their new plots. For many, the situation is dire and their traditional farming practices are no longer able to support their family's nutritional needs: *"take an instance of the elderly that their main way of surviving was farming, now they are in Rweru, they do not cultivate anywhere making most of them have one meal a day and others starving completely being a problem to us."* Some spoke of the ways their poor harvests and increased hunger were negatively affecting school attendance for their children: *"Sometimes I cannot put food on the table and he sleeps with an empty stomach and he cannot manage to go to school the next day."*

Rweru plots are 50 x 40 square meters, which many said were much smaller than what they had on the islands. The difference has been particularly dramatic for those who held large landholdings on the island and now have to make do with one small plot. Sharita residents are permitted to go back to some areas of the island to cultivate, but since Mazane has been converted to military use, those lands are now unavailable. Several spoke of beehives or banana plants that they had been unable to transport and now couldn't access.

Many (42%) noted that they were not compensated for the loss of their island properties, and without funds they are unable to supplement their nutritional needs with purchased items. Compared to the islands, prices have become a barrier: *"They are facing food shortage here while at Mazane, the food was not expensive. For example, you could get 10 fish at 500 RWF but now you only get 3 fish. Also, a basin of sweet potatoes was 200 RWF but now a tenth of it is 500 RWF."* Cash flow is a pervasive problem; new residents have not yet been given land titles to their new properties, and without secure land tenure, access to credit has been difficult.

The provision of a cow to each family did not seem to offset these losses, and many reported struggling with livestock management: *"Raising a cow is difficult because it requires a lot of effort. My cow did not produce enough milk during its first birth, and I was alone at the time because my husband had left, so no one could help me."* Several described lack of access to the manure fertilizer produced by their own cows. They were told it would be allocated by the cooperative, but that hadn't occurred. Further, respondents told us they were not permitted to rear any other livestock in Rweru, including goats and chickens, and this prohibition was both a financial and nutritional loss. Being unable to keep domestic animals also eliminates a common savings strategy: "*The difficulties we have are that no one can rear any short domestic animals, such as goats or pigs. We, the people, used to be financially supported by domestic animals. When you have a problem, you sell it. For Rwandese, sometimes the time of cultivation arrives when you don't have enough money to buy seeds, so you sell that animal to fix the problem."*

Even drinking water can be scarce in Rweru, and residents described a range of strategies to fill their jerrycans: *"There is only one tank of appropriate water that uses solar energy. However, it is hard to obtain; there is often a lengthy queue of people who want it, and some end up drinking tank water."*

Throughout the village, there was a general sense of unfairness among the different phases. Many pointed to phases that got furniture when they didn't: *"They supplied nice curtains for those who came before us, but look at us, look at this empty living room, are we condemned? Why didn't they do the same for us?"* Many felt the policy of equalizing plots for resettled households was fundamentally unjust. Respondents described other promises not kept by government authorities, such as a cash transfer that never materialized.

Impacts of COVID-19

At the time of this fieldwork, Rwanda had cycled through two rounds of lockdown, and the country was in an unstable pandemic state. Residents in Rweru had widely differing perceptions of the impact of the pandemic on their lives. For them, lockdown meant isolation, not seeing friends, not going to church, and not going to the market. They described difficulty selling crops and finding trade impossible as local markets and the Burundi border were all closed. Some reported penalties for violating restrictions. Others said the pandemic had led them to stop working in their off-farm jobs; for example, banana beer makers couldn't sell their product because bars were all closed.

We didn't encounter anyone who reporting having been infected, but most (66%) reported hearing of fellow villagers who had been sick: *"I recently learned that the coronavirus had infiltrated our village, although I haven't yet met a coronavirus patient."* Nobody reported death among their family or neighbors from Covid.

7. Discussion

With 68 of the total 296 households contacted, we heard from 22% of all Rweru residents, across all four phases of development. With only a few minor exceptions, we heard remarkably consistent themes, language, and explanations. While it is always difficult to identify a point of data saturation in qualitative social science research, our findings suggest that this sample is likely representative of attitudes across the village.

As a climate change adaptation strategy, evidence from Rweru suggests that resettling vulnerable households away from high-risk zones results in net benefits for residents. Integrating resettlement with development, poverty reduction, and environmental protection ambitions, as the GoR has done through the Integrated Development Program and model green village programs, offers even more profound gains. With policies and institutions echoing consistent principles for resettlement, it is likely an indication of effective *mainstreaming*, whereby governments embed climate adaptation into other national priorities. Still, significant challenges remain for Rweru residents to experience the full suite of advantages envisioned by policy-makers. Without overcoming those hurdles, improvements to individual and community scale *adaptive capacity* will be limited.

Drawing on the 11 pillars of the Integrated Development Program, and based on what we saw in the village and heard from residents, the summary chart here (see Figure 1) offers a preliminary evaluation of the extent to which Rweru Model Green Village has so far achieved its desired

aims. For each category, a score of green, yellow or red is assigned as follows. **Green** categories are those that seem broadly successful based on feedback from interviewees. **Yellow** categories are more mixed, either because they have been only partially achieved or because respondents were divided in their opinions. Red categories were either not seen through our data, or were the subject of consistent criticism from residents. One category – ecosystem protection – was not part of our research, and we didn't collect any relevant information; that one is left blank here.

Figure 1: Assessment of Rweru Model Green Village Across Eleven Integrated Development Program (IDP) Pillars

IDP Pillar	Reason for Score	Representative / Sample Quote(s)
Social protection	Many described feeling safe, having access to schools and health care, and being protected by local authorities. Some described receiving *ingoboka* payments.	"We are close to health care facilities with doctors, and students who want to study may do so." "I appreciate this place because I am able to approach leaders for help. When I face any problem, they are ready to come." "One advantage is that when I arrived here, they started to give me a monthly allowance as an adult called *ingoboka*. Each month I get 18 000 RWF, which helps me to buy salt, sugar, soap."
Infrastructure development (focus on energy)	Many described reliable electricity. Solar energy pumped the water tanks. Biogas energy does not yet seem to be widely used.	"We didn't know how to use electricity but now we have it, we will switch on the lights soon when it gets dark." "At Mazane, we didn't have the electricity but now we do and we are able to recharge and even replace the broken bulbs." "The first phase was given biogas and they are now cooking with it."
Cooperative development	Farmer and cow cooperatives had been formed, but most residents reported disappointment with those institutions.	"Some of us even failed to care for the donated cows and had to return them." "I will keep being a cooperative inactive member because I am not benefiting from it. To many of us, the cooperative is useless." "We're still working on cooperatives, but we're not getting anything out of it. The leaders are entitled to the benefits."
Off-farm employment	Several mentioned off-farm employment, but	"I personally have a small shop here with a few items such as sugar, rice, soap and other small things. This

	with markets disrupted due to the pandemic, those jobs were threatened.	is where I acquire basic needs to support my family like food and other needs." "Now you see that I have this small grocery shop, it required me to sharpen my mind and figure out what to do in order to sustain myself and my family as well."
Promotion of micro-finance and insurance	Some reported having gotten bank accounts or small loans, and a few mentioned health insurance. They had difficulty accessing credit without land titles.	"They told us that they gave us farms but we don't have their land titles. How can I call it my property while I don't have its land title?" "We requested the opening of bank accounts after learning that we would be receiving funds. Our initial thought was that after being compensated with that money, we should purchase new materials as needed. Unfortunately, we have never received that money and have not seen the person who requested that we open bank accounts again." "Because of the free health insurance, they gave us as a help when we came here at the first year. Those who did not have health insurance immediately acquired it."
Voluntary Resettlement	Settlement in Rweru was not voluntary, but most supported the decision.	"We were involved in the relocation decision; it was made by the government, and we had no choice but to accept it." "Since I was young, we were told that we would be relocated, the district officials and the ministry of local government staff used to visit the island and told us that the time for being relocated is getting closer but we couldn't believe it."
Leadership development	Capacity building efforts were seen across sectors, suggesting future community leadership and enhanced social cohesion. However, few respondents spoke directly to these themes.	"Another advantage is the increased social interaction, as people can now join together and share their various thoughts and ideas."
Post-harvest processing &	Aside from banana / sorghum beer, there is	"I borrow sorghum from someone in order to make sorghum beer. If I take RWF 5,000 worth of sorghum

marketing	little evidence of this happening in Rweru.	and make RWF 6,000 or RWF 7,000 from sorghum beer, I will refund the RWF 5,000 to her/him and continue operating in this manner. And I use the surplus to pay for my expenses."
Land productivity	Plots in Rweru were described as small and infertile.	"I don't get the same crop yield as I used to. I owned seven land plots, and when two of them became unproductive for a season, I was left with five others from which I could produce well. But for this one plot of land, if the production is poor, that's it. There isn't anything else I can do." "If we could get a harvest, we can sell some portion and make some money but the farmlands we were given are barren, we don't harvest anything from there."
Promotion of ICT	Nobody mentioned this. We didn't see any evidence of technology.	--
Rehabilitating ecosystems	Unknown / didn't ask about this.	--

These findings should be understood in context. Unlike many of the other Integrated Development Program villages, Rweru is comprised entirely of highly vulnerable residents who were required to accept government housing. Across a range of indicators – including literacy, health, and off-farm skills – the population of Rweru will struggle to contribute to robust national economic and social development. The village is only five years old, over a year of which has been in a global pandemic. Disappointing Integrated Development Program results are to be expected under those conditions and should not be misconstrued to represent a decisive programmatic critique.

8. Next Steps

The case of Rweru raises critical themes that merit future research. Two lines of inquiry are particularly relevant. First, Rwanda's Integrated Development Program should be studied in more detail across a more representative sample of villages in all four provinces. Focused attention on each of the eleven pillars can guide the construction of semi-structured interview questions. Gaps in knowledge –such as whether ecosystem rehabilitation has occurred – can be more strategically integrated into future assessments. Measuring progress this way in dozens of villages that have different attributes will provide essential context for the case of Rweru. This comprehensive review will make it possible for researchers to advance meaningful recommendations that can improve the Integrated Development Program across Rwanda. A

proposal to support this expanded version of the project has been submitted at the University of Rwanda, and we expect to learn of any funding awarded in the coming months.

Second, research should better frame the criteria for success in climate change adaptation. The notion of *adaptive capacity* in Rwanda should be tied to measurable indicators and better connected to adjacent policy priorities like poverty reduction and economic growth. Revisiting the methodology with these more focused objectives in mind, my research proposal currently under review offers a preliminary set of interview questions that can drive a more narrowly focused inquiry. With a more tangible theme rooted in Rwanda's current national development, research can produce useful findings.

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