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Mitigating climate-induced migration in rural Morocco: Improving sustainable development to address socio-economic and environmental causes of migration

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Mitigating climate-induced migration in rural Morocco

Improving sustainable development to address socio-economic and environmental causes of migration.

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Key Terms

Agricultural Extension is the function of providing need- and demand-based knowledge in agronomic techniques and skills to rural communities in a systematic, participatory manner, with the objective of improving their production, income, and (by implication) quality of life.

CIM is an abbreviation for climate-induced migration or migrants referring to people who can no longer gain a secure livelihood in their homelands because of drought, soil desertification, deforestation and other environmental problems together with associated problems of population pressures and profound poverty.

Drip irrigation is an irrigation method that saves water and fertilizer by allowing water to drip slowly through a network of narrow tubes that deliver water directly to the base of the plant.

Intergovernmental Panel on Climate Change (IPCC) is the leading international body for the assessment of climate change. It was established in 1988 to provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts.

Permaculture is the development of agricultural ecosystems intended to be sustainable and self-sufficient.

Morocco Green Plan or “Le Plan Maroc Vert” is Morocco’s government strategy adopted in 2008 to revive the economy of the agricultural sector. This policy aims to improve the incomes of farmers; ensure food security; protect natural resources in different regions; and integrate Moroccan agriculture into national and international market

Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs according to the UN World Commission on Environment and Development in 1987.

Rif or Riff is a mountainous region in northern Morocco, with some fertile plains, stretching from Tangier in the west to the Melwiyya River in the east.

Rural exodus is a term used to describe the migratory patterns of peoples from rural areas to urban areas.

Abstract

Morocco unique geography has made the country vulnerable to climate-induced migration (CIM)¹ for three reasons. First, Morocco is located in a region identified as the highest vulnerability to climate change (IPCC, 2014). Second, Morocco's economy remains dependent on natural resources due to a history of neo-liberal development and agriculture policies (Davis, 2006). These policies' failure to diversify and develop the economy in rural regions has made Morocco the most geographically inequitable country in the MENA region (World Bank). Lastly, located just 14 km from Spain, Morocco has a 50-year history of migrating to Europe for work and opportunity (Eddouada, 2014).

This paper (1) explores the causes of future migration and exodus from rural areas in Morocco. (2) Analyzes the present implementation of sustainable development in Morocco and its' ability to mitigate both climate change and CIM using interviews and participant observation. (3) This study's findings identify shortcomings in both governmental and non-governmental approaches and provide recommendations for the improvement of development projects in rural Morocco.

¹ Climate-induced migration (CIM) refers to people who can no longer gain secure livelihood in their homelands because of drought, deforestation and other environmental problems *together* with associated problems of population pressures and profound poverty.

I. Introduction

For the past 50 years, Morocco has been experiencing rural exodus due to socio-economic and environmental stress exacerbated by ineffective development policy. Morocco's population was 75% rural in 1962 and 42% rural by 2014 (Lahlou, 2014). During this rural exodus, Moroccans moved to urban centers and abroad to find job opportunities and provide for their families. The populations of major cities such as Rabat and Casa Blanca have increased from 400,000 and 500,000 to 4 million and 5 million respectively (Lahlou 2014). Furthermore, 4 million or approximately 10% of all Moroccans now reside abroad mostly in Europe or North America (Eddouada, 2014).

Despite this historical trend, the propensity to migrate will only continue to grow with the current environmental and socio-economic trends facing Morocco (Lahlou, 2014). There is no doubt that social processes that create marginalization and poverty are the most important determinants of migration. But in the past 5 years, 10-20% of migration in the MENA region was due to climate stress (Liverani, 2014). The present and most critical impacts of climate change on this region will be crop failures, land desertification, and water resources stress. In Morocco, socio-economic processes will continue to be the cause of migration but environmental stress will be the trigger (Barnett, 2010).

The agricultural sector and especially "social agriculture" maintains basic food security in Morocco and reduces migration to cities by anchoring populations to rural areas (Ait Kadi, 2012). Agriculture production employs 46% of Moroccans yet it only comprises only 15% of GDP (Lahlou, 2014). Morocco's agricultural productivity per capita and per hectare remains one of the lowest in

the MENA region and is even regressing due to the current affects of climate change (Ait Kadi, 2012).

Due to a history of inequitable agricultural policies, 5.5 million Moroccans are subsistence farmers surviving on 5-8% of the agricultural land (Lahlou, 2014). The marginal lands available to subsistence farmers will be the first to become unproductive due to climate change (Behnassi, 2014). If development policy cannot provide adaptation to climate change or diversify the rural economies than increases in drought, floods, erosion or desertification will force these subsistence farmers to move to urban centers or Europe.

Therefore, Morocco's future environmental, economic and political stability lies in the development of its agricultural sector and rural communities. In 2012, the Ministry of Agriculture and the president of the General Council for Agricultural Development (CGDA) described three potential scenarios for Morocco by 2030 depending on the development policies adopted in the next two decades (Ait Kadi, 2012).

The first and most likely scenario, "surrendering to liberalization" is caused by current trends and trade agreements. This scenario assumes that changes to climate are not corrected and institutions do not change. Under this scenario, Morocco enters a water crisis due to inefficient water usage and desertification expands. Rural areas become further impoverished as agricultural production becomes more volatile and non-agricultural employment remains minimal. Rural development remains weak, as agriculture becomes an even smaller percentage of GDP. As the agriculture sector deteriorates, this scenario results in mass migration fuelling urban and even political instability by 2030.

The second and least desirable scenario, “accelerated liberalization” would be caused by the current trend of continuing to liberalize policies and trade agreements. In this scenario agriculture is only valued for its commercial goods and Morocco removes protections on both red meat and cereal imports. Under this scenario, sustainability and rural development are not prioritized causing water crisis and less profitable agricultural sectors to disappear entirely. This scenario results in highly capitalistic agriculture, significant reduction of rural population, depleting all available resources, and political instability by 2030.

Finally, the third scenario, “mastering liberalization” is caused by diversifying the rural economy and changed policies to allow pluralistic competition and sustainable agriculture. Under this scenario, there is land tenure and credit support for farmers, capitalistic farmers integrate environmental responsibility, and incentives/subsidies support farming in less favorable areas. This scenario also assumes that improved water demand management leads to efficient water saving practices and an 80% increase in the output per cubic meter of water used in agriculture. Rural development in this scenario addresses illiteracy, professional training, and invests in roads and electricity. Overall, rural populations increase due to the benefits of city life in the countryside and subsistence farming decreases due to new agro-industry and ecotourism diversifying the economy. This scenario results in reduced migration to urban centers and abroad and provides political stability.

The scenarios in “Agriculture 2030” identify the drastic changes that development policy could have on Morocco’s environmental, economic and political future. The foresight of “Agriculture 2030” provided the basis for a new

agricultural strategy called “ Le Plan Maroc Vert”. Le Plan Maroc Vert (also referred to as the Morocco Green Plan) is a two-pillared plan to simultaneously increase the productive of value-added farming systems and provide support for social farmers in unfavorable areas (Ministry of Agriculture and Maritime Fisheries, 2012). Morocco is investing in its agriculture to (1) increase agriculture production, (2) improve the livelihood of households around the country (3) reduce the impact of climate change (World Bank b, 2014). According to Azziz Akhannouch² “an important component of the Maroc Vert is solidarity based agriculture among small farmers that focuses on the various steps it takes to respond to environmental issues and climate change” (World Bank, 2014)

Many regional organizations and NGOs have started developing the economic potential of their rural regions (Behnassi, 2014). These independent organizations focus on agricultural extension, environmental stewardship and the creation of cooperatives. Subsistence farmers cannot produce the quantities demanded by international buyers and even local markets independently. These projects help rural producers attain access to new markets by agglomerating their production in the form of cooperatives and even associations of cooperatives. These cooperatives have begun to adapt their rural economies to climate change by building social cohesion and overcoming stagnant production (Ben- Meir, 2014). They are also diversified their rural economies by investing in new products such as clothing, cooking and beauty product cooperatives.

My research investigates the implementation of both governmental and non-governmental development projects in rural Morocco. My findings from this

²Azziz Akhannouch is the Minister of Agriculture and Maritime Fisheries

investigation identify shortcomings in the current governmental policy and provide recommendations on how to set Morocco on the path to “mastering liberalization” through improved rural development³.

This paper will be organized as follows: Section II will first discuss the literature of agriculture policy, climate change and migration in Morocco. Then it will introduce a framework to mitigate negative impacts of CIM through development. Section III presents the methodology, fieldwork and interviews used to conduct primary research in this study. Section IV summarizes key findings and results regarding the trajectories of both governmental and non-governmental development in Morocco. Section V includes concluding remarks and uses my research findings to provide recommendations for future development approaches. Section VI discusses the limitations of this study including language barriers, time constraints, and schedule changes due to severe weather. Finally, section VII identifies areas for future research.

II. Literature Review

History of agriculture & development

The present vulnerability and poverty in rural Morocco can be explained by three phases of agricultural reform since Morocco’s independence from

³My paper focuses specifically on development to mitigate CIM from rural Morocco and does not address CIM migrants entering Morocco from Western Africa. However the literature used and strategies suggested could also be applied to CIM from West Africa in a separate study.

French colonial rule in 1956. The first phase (1965-1985) is characterized by weak agricultural production and decline in per capita production levels due to policies that nationalized the property rights of previously shared lands (Ouraich, 2012). King Hassan II perpetuated a colonial tradition of blaming land degradation on livestock overgrazing due to traditional shared-land pastoralism. He used this rhetoric (despite no reliable data proving shared land pastoralism caused degradation) to privatize agricultural lands and transition ownership to the state (Davis, 2006). The World Bank rewarded this privatization by providing their first loans to Morocco in 1964. The World Bank also encouraged King Hassan II to dedicate to export crops such as citrus and vegetables by providing new technologies including irrigation, machinery, fertilizers, and seeds (Davis, 2006).

During this period, investment and development of the traditional agriculture sector stagnated. The production of staple cereals received little attention requiring larger cereal imports to provide bread for the growing population (Davis, 2006). This neoliberal restructuring hurt poor rural populations by reducing subsidies for staple foods, rolling-back funding for education and encouraging cheap imports which undermined local production and resulted in job loss (Davis, 2006). The World Bank has acknowledged that their method of livestock management implemented in this era (to combat presumed degradation) failed in Morocco and throughout Africa (Davis, 2006). The consolidation and titling programs initiated in this era also had no beneficial impact on agricultural productivity and simply resulted in the rapid loss of previously communal lands from rural communities.

During phase II (1985-1991), Morocco displayed a 6.7%/year increase in productivity per capita (Ouraich, 2012). This improvement can be attributed to favorable growing conditions, doubling the wheat cultivation, and the continued liberalization policies, which freed the agriculture sector from income tax. This new tax policy and increased privatization consolidated the agriculture sector and reduced the amount of land owned by small-scale farmers (Ouriach, 2012).

During this time period, Morocco was bankrupt due to the combined costs of occupying the Western Sahara (estimated at \$1 million USD/day) and a collapse of the phosphate economy (Davis, 2006). Therefore success in the agricultural sector was quite valuable to the national economy. However, the generous investment in the agricultural sector (and large tax breaks to assure its' success) originated in personal interests and created gross inequalities of wealth. The main beneficiaries of liberalization policies were the royal family and their network of upper-class supporters (Davis, 2006). Many of the lands and sectors of the agricultural economy privatized during phases II and I were subsequently controlled by companies owned by the royal family (Ouraich, 2012). King Hassan II also compensated men who supported his regime by organizing profitable business agreements in the agriculture sector and agribusiness. In 1970's and 80's, the royal family held one-fifth of the overall wealth in Morocco and ten individuals (supporters of the monarchy) held over 1/3rd of the wealth in Morocco's economy (Davis, 2006).

Phase III (1991-2008) continued the effort of neo-liberalization with a decade of decreased outputs, which reversed in 2002 to significant improvement. Overall, rates of production are higher than in phase II and I. However, this

period is characterized by extreme variations in output due to consecutive droughts. During phase III, poverty tripled in rural areas and now 45% of the entire Moroccan population is classified as vulnerable to poverty (Davis, 2006). Unemployment actually began to increase and was estimated at 19% by 2005 (Davis, 2006). For the rural regions and especially the rural poor development indicators including rates of poverty, unemployment and illiteracy either maintained or became worse during this era to than they were in the 1980's (Davis, 2006).

Morocco has used an environmental narrative to help justify the neoliberal goals of land privatization and the intensification of agricultural production, in the name of efficiency and environmental protection. The transition to value-added modern agriculture due to neo-liberal policies is particularly problematic with respect to water usage in the sector. Under neoliberalism the terminology for accumulation of land is privatization... but the act is nothing other than a legally and institutionally condoned theft (Davis, 2006). These phases began a long trend of patronage, which financially privileges the agriculture sector because "the king is the greatest exploiter of agriculture in Morocco" (Iraqi, 2013).

Agriculture and Climate Change

Morocco is currently in the fourth phase of agricultural development. This phase is guided by the agenda of the Morocco Green Plan and must overcome the additional challenges of climate change on production. The sector remains at the core of the State's economic strategy due to its' important roles of providing employment, food security, and poverty alleviation(Gommes, 2008). There is

high correlation (.93) observed between the growth rates of aggregate GDP and agricultural GDP in the past 30 years. In other words, “when agriculture suffers, the whole economy suffers” (Gommes, 2008).

The GDP of agriculture has fallen from 16.6% in 1985 to between 13-15% per year (White 2007). Evaluations of the effects of climate change on the Moroccan economy found that agricultural sectors (especially crop production sectors) will be the hardest hit by climatic change. The predicted decreases 15% decrease in GDP from this sector due to substantial climate-induced yield shocks are predicted to trickle down and affect productivity in other sectors (Ouraich, 2012).

Morocco has already experienced a 2-4 degree increase in temperature every decade since the 1980's (Gommes, 2008). Rain has decreased 25% overall in the past 30 years.. The rainfall also stopped being well distributed throughout the year with sporadic heavy rainfalls causing flooding and erosion in the winter months. The changes in climate also create more insects and diseases causing livestock loss and crop failures (Liverani, 2014). Climate projections on Morocco show gradually increasing aridity because of further reductions in rainfall and increase in temperatures. Increased aridity is already having a negative impact of agricultural yields with impacts most visible from 2030 and onwards.

This agriculture sector maintains very low productivity per capita because 80% of farmers are working on less than 10 hectare's of land with minimal capital or credit to adapt their production to changes in the growing conditions (FAO, 2009). These small-scale farmers are expected to suffer 50% yield reductions by 2020 (IPCC, 2007). These farmers own predominately rain fed crops (non-

irrigated), which are particularly affected by climate change. A study applying two climate change scenarios to Morocco's six agro-ecological zones across 3 time horizons (2030, 2050, 2080) found decreases in yields in of each of the fifty most important crops to the Moroccan economy. These decreases are more severe for crops without irrigation (which applies to 90% of agriculture in Morocco (Gommes, 2008). This dependence on rain for agriculture is especially challenging for agricultural regions south of Rabat, which only receive 15% of total national rainfall (Ministry of Water, 2014).

It is uncertain whether increased water demand for irrigation can even be met due to water-constraints. The agriculture sector is responsible for approximately 85% of the countries total water consumption (Lahlou,2014). While, Morocco had approximately 4000 cubic meters of water per capita these basins have been depleted to only 700 cubic meters per capita. Morocco (along with all other Maghreb countries) is in the critical sphere of less than 1000 cubic meters per capita-- the estimated minimum to satisfy human needs (Lahlou, 2014).

Climate-induced Migration & Development

Therefore the present and potentially future agricultural sector in Morocco is still highly dependable on climatic conditions and natural precipitation. This gap in infrastructure and development to mitigate the impact of climate change is the biggest difference between how climate change impacts Morocco and other Mena region countries in the Mediterranean basin compared to their European counterparts.

For example, farmers in Australia experience comparable climatic variability as those in Ethiopia. But farmers in Australia have the technology, agricultural extension and credit to adapt to climate variability. Meanwhile Ethiopian farmers only available form of adaptation is to migrate to avoid famine. This is an extreme example but it identifies that migration from Ethiopia is actually driven by institutional failures and poverty triggered by climatic variability (Barnett, 2010). Similarly, Moroccan subsistence farmers informed me that they make 100 dirhams a day while studies indicate that European farmers make 15 times more than a farmer in Morocco. This income gap and differences in ability to adapt explain why migration occurs in regions experiencing similar climatic vulnerabilities.

Climate-induced migration accounts for one-fifth of the present overall migration and is expected to trigger 200 million additional migrants by 2050. North Africa is the #1 most concerning region for CIM due to crop failures, desertification and water stress (Liverani, 2014). Additionally, subsistence farmers and fisherman (almost half the employment in Morocco) are arguably the most vulnerable professions to CIM. Slow on-set changes are much more likely to cause permanent CIM than natural disasters which lead to more temporary resettlement. In the face of slow onset changes, the likelihood of relocating is much higher among young people and much less likely among individuals with secure access or ownership of land (Barnett, 2010).

Therefore interventions to reduce migration should target younger people and create opportunities for land ownership. However, a key question to migration policy is whether migration should be treated as a risk to be mitigated

or rather as an opportunity to be facilitated. A paper published by the World Bank argues that migration has the ability to “enhance the sustainable development of both sending and host areas” (Barnett, 2010). While he acknowledges that migration has risks that must be addressed, he also argues that migration can benefit both departing and arriving communities with the implementation of careful development policies.

The World Bank identifies a strong connection between remittances from previous migrants and the advancement of sustainable development. The report argues that many rural communities experiencing climate change avoid resettling entirely due to the economic security of the remittances of family members abroad. Morocco’s \$4.2 billion in remittance revenue in 2004 dwarfed the countries' earnings in foreign direct investment (Barnett, 2010). Remittances smooth consumption of basic needs such as food across seasons; maintain access to basic needs during climate shocks such as drought’ and stimulate local production by increasing demand. (De Haas, 2007). Due to these positive effects, families with labor migrants abroad fare better during livelihood shocks. Governments can protect this important income for reducing the transaction costs on remittances during times of climatic stress or extreme weather events (Barnett, 2010).

Furthermore, migrants tend to return to their communities of origin regularly if they are confident of their ability to return to their new home. These returns benefit their original community by bringing knowledge of both climate change risks and responses. They transfer new skills, social networks, technology and investments to improve the community’s adaptive capacity. It is important to

recognize that this dependence on remittances and return migrants knowledge exists due to gaps in government intervention, public provisions and financing of adaptation interventions (Barnett, 2010).

According to Mehdi Lahlou (a professor at INSEA and expert on climate change migration) development strategies to effectively mitigate CIM and adapt to climate change start by targeting regions where it is possible to intervene with maximum effectiveness. This means that development projects first should target regions in Morocco with especially high rates of emigration or especially vulnerable economies to climate changes. He argues that effective development policies in MENA countries must use decentralized cooperation to avoid being subjected to the will of the central government due to the absence of democracy and the existence of corruption within monarchies in the MENA region (Lahlou, 2009). Development policy should be implemented by multilateral activities by different organizations with political and economic cooperation to additionally safeguard against the frequent corruption and maintain altruistic projects. Decentralizing the leadership of the development also allows local authorities or experts to guide interventions most suited to their region. Lahlou identifies that development must ensure both basic literacy and the training in the trades required for employment opportunities. Lastly, development should target women and youth because they are the most exploited demographics in emigration networks (Lahlou, 2009).

These developmental strategies to mitigate climate-induced migration and adapt to climate change share several of the same development targets as the desired scenario “mastering liberalization”. I have combined the objectives of

“mastering liberalization” and the development theories discussed in this section to evaluate the current approaches to development in Morocco.

III. Methodology, Fieldwork and Interviews

My research includes interviews 32 people within 20 separate interviews in 4 different regions of Morocco. I also spent approximately 7 days conducting participant observation at different sites of non-governmental development including farms, a permaculture center, and cooperatives of clothing, beauty and food products.

I began my research in Rabat where I conducted 10 interviews with 10 different subjects including academics, ministry officials, international organizations and presidents of development organizations. The purpose of these interviews was to gain context on migration, climate change and governmental approaches to development. These interviews with experts on my areas of research provide information both in English and more up-to-date than data or studies presented in the literature.

Next, I travelled to Al Hoceima, Morocco (a city in the northern “Rif” region) where I spent two days observing the different sustainable development projects associated with the organization RODPAL. I interviewed 10 different subjects in 6 different interviews. These interviews included the president and vice president of RODPAL, local subsistence farmers, a subsistence fisherman, and women employed by two different cooperatives in the region. The purpose of these interviews was to examine rural development in a region with both high rates of migration and recognized environmental activism. These organizations

provided insight about the challenges of living in a region dependent on the land for their economy in an era of noticeable climate change. They also provided first hand experiences of the challenges of receiving assistance through the Morocco Green Plan.

From Al Hociema I travelled to Tetouan where I was housed for three days by the president of Rif Pam, an association comprised of four woman's cooperatives in the region. I spent three days observing the two different cooperatives located in two different rural villages both within 50km of Tetouan. I conducted 3 interviews with 10 subjects including the president of Rif Pam and group interviews with the women employed by the two cooperatives..

Third, I moved to an agricultural region outside of Marrakesh where I stayed on the first permaculture-learning center and learned about the affects of climate change on agriculture in the southern region. I was able to interview two different experts on permaculture who learned about the benefits of permaculture and sustainable agriculture while living abroad and then returned to spent the past year visiting different farming regions of Morocco. These practitioners of permaculture provided insightful ways to improve the productivity of Morocco's agriculture while also increasing sustainability and water conservation. They also shared first hand experience about the difficulties of working within the bureaucracy of the Maroc Verte to receive assistance as a "social farmer".

Unfortunately, my time in Marrakesh was cut short due to the severe rains and flood warnings beginning November 26th, 2014 . I was also scheduled to visit cooperatives in the association Atlas Pam and conduct more interviews with the

Department of Agriculture during the week of November 29th- December 5th but these interviews were cancelled due to either transportation or schedule changes related to the severe weather. The study limitations section below will discuss further limitations experienced during the research period.

All subjects agreed to the terms of the study and were informed that they would receive no forms of compensation and could terminate the interview at any point. All interviews were conducted in English or Spanish or with the assistance of a translator. Many of the individuals and several organizations that participated in my research must remain anonymous due to sensitivity of discussing the Moroccan government. However, several academics and organizations agreed to use their real name to lend credibility to my research and make their recommendations and experiences openly recognized and considered in future developmental policy by the state of Morocco.

VI. Findings and Analysis

The findings of this study illuminate that the implementation of development in rural Morocco is distinctly inconsistent with the goals for development promoted by the government and discussed in the literature. The conversation surrounding development implies that Morocco is on the path to “mastering liberalization” while the actual practice or implementation of development shows far more resemblance to “surrendering to liberalization”.

There are two types of development explored in this study; national governmental development plans and local non-governmental development projects. The plans for governmental development appear to be driven by

economic rather than environmental motivations. These plans claim to have sustainable objectives but fail to address several environmental, economical and educational barriers to rural development. My research discovered much more altruistic and successful implementations of development by non-governmental organizations. Despite several self-identified barriers, these projects show real change in the economic security and environmental stewardship of their communities. However, the success of these projects remains localized and much to small-scale to affect the current trajectory of development in Morocco.

By analyzing the responses from 32 interviews and 7 days of participate observation, the results identify specific changes that would improve both governmental and non-governmental development's ability to mitigate socio-economic and environmental stresses on rural communities. This section explores several themes and both the positive and negative trends generated from my interviews and field-based research.

A. Governmental development & The Plan Maroc Vert

My research does indicate that Morocco has climate change governance in its most infant stages. Climate change is always a part of the “official agenda” and government is receptive to hearing about the risks of climate change. Morocco has also integrated the UN climate change framework and releases a communication every ten years acknowledging the countries own rising vulnerability to climate change. However this progress is still rather slow if you consider that Morocco has been affected by severe weather events and climatic change since the 1980's. Yet they still have not adapted their infrastructure and

their economic sectors to the floods, high temperatures and other extreme weather events that return every year.

In the past decade, Morocco has adopted legal and policy instruments like the Ministry of Environment and the Plan Maroc Vert to address the impacts of climate change. However, the Plan Maroc Vert does not prescribe any specific deadlines for its articulated goals which negatively impacts speed, certainty and efficiency of the overall project. My research identifies alarming shortcomings in the implementation of the MGP including but not limited to (1) a lack of water conservation and land rights, (2) unfair distribution of funding between pillar I and II, (3) insufficient technical support, agricultural extension, and land rights (4) lack of transparency and barriers to participation.

The Plan fails to provide clear standards, enforcement, or attainable incentives for improved water management. Due to changes in precipitation, many regions suffer from flooding in Morocco. Mohamed Behnassi claims that overseeing issues of water abundance in the past decade is the biggest gap in the Plan Maroc Vert. The Plan has not adapted the infrastructure in these regions or developed systems either to mitigate these damages or use this water in regions with shortages. Morocco supposed to draw up a strategy for flooding to continue receiving international funding and to receive international funding for their overabundance of water plan but they missed this opportunity.

Ground water is very important because Morocco only has nine river basins. Interviewees expressed concern that their local water sources are becoming depleted. In Agadir for example, wells have deepened from 25 to 200 feet in the last decade (Behnassi, 2014). This bars access to individual farmers

who don't have access to the technology to dig this deep. Pillar I agriculture is depleting this resource quickly and the government has no way to monitor or enforce where they dig additional wells or how much water they extract (Ministry of Water, 2014).

In an informal and anonymous interview with an individual from the Ministry of Water, I was informed that they do not believe regional water stress is an issue because they identify the needs of each region and then make sure to divert sufficient water to these regions. The ministry informed me that they are implementing water desalinization plants make up for lost precipitation and meet raising demand. These plants would be able to desalinize a cubic meter of water 10 dirhams. However, this plan is not yet in effect and the Ministry of water neglects to recognize or address that water problems are stressing Moroccan communities and livelihoods now.

The ministry needs to be adapting by managing the waste and inefficiencies in Morocco's current usage of water rather than relying desalinization to increase water sources. Adapting to climate change requires expanding irrigation (currently 10% of agriculture is irrigated) with sustainable water systems. Currently the agriculture sector uses 85% of Morocco's water and 65% is wasted due to leaks and faults in the irrigation systems. Additionally, only 14% of total rainfall is captured (Karrou, 2014).

To address these inefficiencies, the ministry could mandate that pillar I farmers either convert to drip irrigation or replace wasteful water systems to receive funding from the Plan Maroc Vert. To expand irrigation of agriculture, the Plan Maroc Vert could provide attainable incentives and economic

reimbursements for the implementation of sustainable water systems for both pillar I and pillar II agriculture.

The Plan claims to subsidize up to 90% of the costs of drip irrigation but farmers interviewed expressed that these subsidies were not attainable. Omar, a farmer located outside of Marrakesh, is saving up to purchase his own drip irrigation system after a year of trying to attain irrigation through the Plan Maroc Vert. Omar explained that the initial paperwork to apply for this government program took about a year to complete and process. He was then informed that to irrigate 6 hectares he would need to be able to provide the entire cost of 350,000 dirhams upfront. Then he would be placed on a waiting list to be assessed and fitted for drip irrigation. Then only once the project was entirely finished and the final papers processed could he receive reimbursement from the Plan Maroc Vert. Rajji and many other small-scale farmers are not able to provide 350,000 dirham or wait through a two to three year system to acquire an irrigation system.

For now, Omar is going to rely on traditional and less expensive forms of irrigation including bios walls and rainwater collection. However, as a return migrant from the US with almost five years of education in agricultural productivity, Omar has more ability and information to adapt independently to water shortages than other farmers in the region.

Interviews with farmers about their experience participating in development projects funded by Pillar II of the Plan Maroc Vert often identified similar faults in implementation to the drip irrigation subsidy program. In Al Hociema, I spoke with the president of the Association Tafnasse for solidarity and development. They received pillar II funding to create a fruit tree plantation.

The project aimed to strategically plant the trees to reduce erosion in the area while also providing an economic opportunity for youth in the community. The project employed 60 youth in during the initial planting and now employs about 200 youth during the harvesting period.

The Green Plan provided the trees for the project but failed to provide information about how to plant or care for them. There was no rain at critical times for growth, which stunted the trees growth and reduced their productivity. The association also did not know how to protect the trees from the attack of insects and parasites. Therefore, the yields from this project and income generated are not as high as they anticipated. Similar projects in nearby villages were more successful because they received almond and fig trees, which are much less susceptible to climatic variation than the grape and fruit trees Tafnasse received.

In development projects funded by pillar II, farmers are incentivized to provide their land or workforce for green plan projects and in return the government provides technical and financial support (Behnassi, 2014). Many projects have experienced insufficient training and technical support like the Tafnasse association. Sometimes private firms implement the project for the first two years and then transition the project to beneficiaries without the sufficient knowledge to maintain the project. Either way, thus far beneficiaries have struggles and not really profited from these collaborations (Lahlou 2014).

While it is clear the Plan Maroc Vert is providing small farmers with grants there is no documentation of who is receiving these grants, why they were chosen or how they applied, what their experience was like, and whether or not the

project benefitted their livelihood (Lahlou, 2014). Transparency and documentation during implementation is important because my interviews identified most pillar II farmers reported unsatisfactory experiences collaborating with the Plan Maroc Vert. An interview with the World Bank verified that frequently the beneficiaries of Maroc Vert struggle because they were never included in the design of these development projects. Including beneficiaries and local leaders in the projects design is very important due to the geographically and culturally diverse regions of the country (The World Bank, 2014).

Without local input, these development projects fail to take into consideration the unique limitations and most beneficial pre-existing barriers to small-scale farmers. I attempted to address this failure by conducting a group interview with subsistence farmers. I received feedback that identified the types of government aid that would be most beneficial to small-scale agriculture.

1. A greenhouse to protect young plants from climate effects.
2. Irrigation: subsidizing the cost of installation would overall improve his productivity or increasing knowledge about traditional irrigation methods.
3. Clothing to protect farmers from the increased parasites and insects (caused by reduced rain) destroying crops and the pesticides that prevent them.
4. He doesn't know how to use the pesticides or other inputs and they do not have instructions in languages they can read. In general technical aid and education about planting cycles and soil would help increase production.
5. Souaks that benefit farmers not intermediaries.

The farmers I spoke to identify that water drought have affected their crops especially in the summer months. They expressed frustration that small agriculture does not receive “anything” from the government while bigger

farmers receive a lot of aid and support from the government. They indicated that there is no other employment in their region and that their salary as subsistence farmers barely covers basic needs and does not provide savings for investment or improvement in their land or plants.

These farmers also identified that a significant economic barrier to their livelihoods is the structure of local souaks which require that farmers rely on an intermediary. These intermediaries pay farmers 1/10th of market price for their goods. In the short term, these farmers wish they could attend souaks themselves so that they could receive the full financial benefits of their production. In the long term, these farmers aspire to aggregate their products so that their goods can move directly to souaks, cities or even larger markets without the financial loss of an intermediary. Organizing themselves into this form of a cooperative or local business could be accomplished with technical support from pillar II funding. This is a very interesting finding, because I have found no mention of souak structures disadvantaging farmers in the literature, in the plan Maroc Vert, or in my interviews with academics and ministry officials.

My interviews with academics, sustainable development consultants and all identified that redistributing the funding between pillar I and pillar II could better achieve their objectives for economic, environmental and social improvement. Saadia Zaadia from Association ASSID of Sustainable Development discussed the idea of 65% funding going to pillar I agriculture and 35% of funding going to pillar II. Pillar II agriculture is actually the most important side of the sector for livelihoods, rural development, jobs, protection against climate change, and avoids many of the negative social and environmental

externalities of modern agriculture. Furthermore, pillar I agriculture only benefits 5-6% of farmers and has not led to significant changes in the agricultural sectors production or improved Morocco's trade balance. Redistributing funding between the two pillars would help Morocco's Green Plan achieve its environmental and social goals and provide the sufficient funding to address the barriers experienced by cooperatives, subsistence farmers, and other non-governmental development projects. Lastly, the my interviewees mentioned that the Morocco Green Plan fails address the history land privatization and unequal land access that divides pillar I and pillar II farmers.

Finally, it is important to mention that there has been no real production differences or infrastructural differences between 2008 and 2014. After 6 years of the Green Plan Morocco is still dependent on rainfall in most agricultural areas and is still experiencing a deficit in agricultural trade requiring them to import for basic consumption (Lahlou, 2014). Families vulnerable to migration socio-economically remain on lands vulnerable to changes environmentally. The minister and the king are still the important farmers in Morocco and agricultural policies are very closely linked to their financial interests (Lahlou, 2014).

B. Non-governmental development & the women's cooperative.

“Even quicker than governmental organizations, non-governmental organizations are creating plans and adapting their communities to climate change” – interview with Mohamed Behnassi.

My interviews and observations of non-governmental development projects identified several positive and frequent trends that eclipsed differences in either product or region. The majority of my interviews regarding local

community development took place with women's cooperatives in the Rif. These cooperatives produced tea, herbs, plant-based beauty products, honey, cactus jam, clothing and cooking lessons for tourists. Creating associations of cooperatives benefit each cooperative because working together they can make more product with less money by sharing supplies and capital. They can also access more markets and bigger buyers when they conglomerate their products than any of the cooperatives could access independently.

Every woman I spoke to in the cooperatives mentioned that they like coming to work because the cooperatives are spaces only for women. They are grateful for cooperatives because they are a source of employment trusted by husbands and parents. Cooperatives also provide a rare source of income for single women or single mothers in the Rif. All women in the cooperative were either independent or supplementing the income of a subsistence farmer or fisherman.

This shows that cooperatives are diversifying the incomes of families previously dependent on climate vulnerable livelihoods. Women at Cooperative Moulay Ab Salam stated that the cooperative provides a better income than their husband's jobs as subsistence farmers or livestock shepherds. All women interviewed indicated that migration was common in their region but they themselves were less inclined to migrate than their peers. One woman stated that the cooperative is very important to her life and the reason she has never considered migrating even though she has family abroad.

These three cooperatives each employ 10-20 women on average and the combined associations of Rif Pam and Atlas Pam employ 100 and 200 women

respectively. Both of these associations and RODPAL provide additional initiatives to address illiteracy among the members of the cooperatives. These associations also provide the vocational training to make the products and work on professional skills including communication, accounting, and marketing abilities. The son of a woman in cooperative Moulay Ab Salam stated that helping rural women attain an income is beneficial to the entire community because they invest this money in children's education and clothing.

However, these cooperatives also identified common barriers to their development efforts. All of the food- or plant-based cooperatives (not the clothing cooperative) indicated that their biggest barrier is water shortages. Due to changes in precipitation the inputs for their products have decreased rapidly in their region. These women are dependent on husbands or community members with trucks to go further and further away to harvest plants and herbs.

The cooperatives wish they could begin to farm their own plants and herbs to increase and stabilize their supplies. However, this would require irrigation stretching to the river basins because nearby ground water sources are depleted. The cooperatives that produce beauty products feel especially stressed for water because their system for converting plants into oils and products requires a lot of water. Accessing this water has become a greater time constraint and slows down production. All the cooperatives would need assistance to purchase the start up materials to grow their own inputs and mentioned a need for better storage facilities so they can protect their plants and herbs when they can attain a large supply.

Women from all the cooperatives stated that they have noticed (1) rapid changes in their environment that has (2) negatively impacted their local economy. A woman from Cooperative Moulay Ab Salam stated, “it used to snow here every year but now it does not even rain”. Her friend added, “if it does rain it comes down so hard it cannot settle into our plants before it washes down the mountain. This hard rain is also very bad for our bee population”. The wives of fishermen spoke about how fish stocks have depleted and changing current patterns have made fishing significantly more dangerous for small boats. Women from all the cooperatives stated that their region needs more cooperatives and more types of work independent of the environment. Women from Al Hociema want their region to benefit from the tourism economy by establishing cheap direct flights with France, Italy and the Netherlands. Due to the low costs of hotels and restaurants in the area this would both increase the tourism of Moroccans living abroad and Europeans in Al Hoceima.

Finally, cooperatives in both regions find it hard to access markets both geographically and professionally. The cooperatives' locations require that they transport products to expositions in Rabat where international buyers pay a premium price for organic and locally produced goods. The cooperatives wish could create more local demand by promoting their products among tourists in main cities in the Rif. The founder of ASSID and the president of Rif Pam both identified a need for better accounting systems within cooperatives. Currently, these systems have no system to record sales or annual earnings. This lack of accountability has led to theft in the past from members of their own cooperatives.

These barriers identified by the cooperatives could be ameliorated with project grants from pillar II of the government plan. But women have not considered applying because they do not know about the opportunity. Despite these barriers, I found the cooperatives very successful and resourceful at accomplishing both their work and their overall goals of creating new sources of income in their community and economically empowering their members.

V. Conclusion

“Migration due to environmental change and climate change is an acute problem in Morocco that will increase in the near future”

- Mohammed Behnassi.

My research suggests that development initiatives in Morocco will not achieve the desired scenario of “mastering liberalization”. My findings also suggest that the funding allocations and implementation of the Plan Maroc Vert do not support or align with its claimed goals of (1) adapting to climate change, (2) improving livelihoods and (3) increase agriculture production and productivity. Localized and non-governmental development proved to be more efficient at allocating it’s funding and implementing its objectives in rural Morocco. While these projects effect real change for their employees, they remain far to small in scale and scope to affect overall development of their region. Furthermore, cooperation’s identified several constraints to their work that must be addressed in the near future to continue their successful impact on communities

While my study is by no means conclusive, I was very impressed with the common themes and patterns described by my interviewees despite their quite

diverse locations, professions, and relationship with development initiatives in Morocco. This study can be viewed as a preliminary examination of development implementation and identifies a plethora of areas for improvement.

In the short run, Morocco should include measurable, incentivized and enforced standards for water management in the Plan Maroc Vert; redistribute the funding between pillar I and pillar II; and include beneficiaries in the planning process. Maroc Vert should also consider decentralizing implementation to support the local leadership and effectiveness of non-governmental programs.

In the long term, Morocco needs to address the long history privatization by creating systems for land access to ameliorate the inequity and opportunity between farmers in pillar I and pillar II. Lastly, Morocco will need to address the corruption in their governance of agricultural and environmental policy. Finally, to master liberalization in the future Morocco will need to legitimately invest in diversifying their rural economy.

VI. Study Limitations

This study faced four limitations or caveats despite careful preparation and organization to ensure an authentic, informative and relevant research process.

Severe weather and flooding from November 26th-December 4th impeded travel in southern and eastern Morocco. This shortened my trip to the permaculture institute in Marrakesh and cancelled my visit to Atlas Pam cooperatives. My follow-up meeting the Ministry of Agriculture was also

cancelled because my contact could not return to Rabat due to the severe weather. I find it very ironic that research on the impacts of climate change was interrupted by severe weather events. I do not believe these interviews would have changed the outcomes of my research but they potentially would have further supported my results and made my evidence more conclusive.

I intentionally chose interview subjects who spoke English or Spanish to avoid a language barrier and attained translators when other languages skills were needed. I was aware that the majority of the interviews in Al Hoceima and Tetouan would be in Spanish or translated from local languages to Spanish. I prepared for this reviewing relevant vocabulary and translating my interview guide ahead of time. But I was unprepared for the vast difference between my interviewees and translators ability to understand Spanish versus speak Spanish.

Repeatedly, my interviewees or translators understood the questions but felt uncomfortable or unable to communicate their answers in Spanish. I tried to follow up with these interviewees by email because they claimed they could express themselves better in writing. But I did not received their responses in time to include them in my study due to a lack of regular computer access in their rural areas. This unforeseeable language barrier disappointed me because it limited my ability to ask the more intricate questions in my research while in the Rif region.

My paper focuses on development within the agricultural sector and the Morocco Green Plan. But initially my research also included the enormous changes occurring in Morocco in the energy sector. Morocco is a recognized pioneer in the energy sector forpledging to reduce energy usage by 15% and to

provide 40% of its energy through renewable energy sources by 2020. Morocco may also become the main provider of energy for the European Union's pledge to use 20% renewable energy by 2020. Morocco's investment in wind will save 5.6 million tons of carbon and solar will save 3.1 million tons of carbon a year (Cirliq, 2013). My primary and secondary research also explored the implementation of these changes and their impact on job opportunity in rural economies. But I omitted these sections from my final paper for the sake of cohesion and clarity.

Finally, time was by far the most limiting constraint of my research. The speed of making contacts, setting up interviews, reaching remote destinations and conducting interviews is much slower in Morocco than in the United States. Time would have improved interviewee trust/confidence and allowed me to accommodate for the diversity of language barriers. Due to the complexity of this subject, I wish I could have extensively conducted research for 6 months or even a year to further support my findings. Please consider the limitations of time when you evaluate the conclusiveness of study.

VII. Recommendations for Future Studies

This research could benefit from many further studies. SIT students could build on this research by expanding the number of interviews or investigating other sectors of development. A similar study regarding CIM immigration from West Africa could look at similar development strategies either in Morocco or the migrant's home countries.

As discussed in my study limitations, a similar study could be conducted to look at the development in the energy sector of Morocco. This green economy is receiving large investments both nationally and internationally. Are the changes in this sector creating jobs that benefit the local economies or is this development benefiting private and foreign companies?

The implementation of the Morocco Green Plan and the affects of climate change are both time-sensitive and will require frequent re-evaluation in the future. Future research could also determine if the recommended changes from this study have been included or should still be included in the future. There will always be demand for research on the policy and implementation of development due to their important impacts on environmental, economical and political stability in Morocco.

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Appendices

Appendix A:

Interview guide for cooperative members, farmers etc.

1. How long have you worked for this cooperative?
2. Would you describe your job to me?
3. What do you like about working for the cooperative?
4. What is challenging about working for the cooperative?
5. Does the cooperative provide a good salary?
6. If you didn't work for the cooperative would you work a different job?
7. If you could change to a different job would you?
8. What skills do you gain from this job?
9. What do you wish for this organization in the future?
10. Who is in your family?
11. Does your husband or wife work? If so, where?
12. Have you ever thought about moving to a city or another country?
13. Is anybody in your family abroad?
14. Why do you think people migrate from your region?

15. Have you ever heard of climate change or global warming?
16. Do you think the environment or the agriculture in your region has changed in the past 10 years?
17. Do you think protecting the environment is important to the cooperative?
18. Is it important to you?
19. What is good about agriculture in your region? Why is it important?
20. What is challenging about working in agriculture in your region?

Interview guide for development agencies, academics or presidents of cooperatives:

1. How long have you been doing this work?
2. Can you describe to me the work of your organization?
3. Where specifically are your projects located?
4. How many people are employed by this organization?
5. How are people recruited? Are there any prerequisites for being a member?
6. How many years on average do people work at the cooperative?
7. What do you do for your job?

8. If you do not mind answering this question, how much does each member of the organization make on average?
9. What skills do members gain from working here?
10. In what ways is your organization successful?
11. What ways challenges or problems does your organization face?
12. What are problems with sustainable development in Morocco?
13. In what ways is morocco successful at sustainable development?
14. Has government work ever benefited your work or organization?
15. What do you think of the Morocco Green Plan?
16. Do you think the green plan should increase funding for regional or independent NGO projects?
17. What affects of climate change is Morocco not prepared for?
18. What regions or populations are most vulnerable to climate change?
19. Do you think that migration from rural areas is a problem and why?
20. Do development projects like yours affect migration?
21. What do you wish for this organization in the future?

Appendix B:*CONSENT FORM***1. Brief description of the purpose of this study**

The purpose of this study is to:

1. Explore how climate change has affected Morocco's economy and caused migration to urban areas and Europe.
2. Do responses to climate change through sustainable development projects in Morocco improve the quality of life and economies of rural areas prone to high rates of migration?
3. Is there a difference between the effectiveness of sustainable economic development implemented by the government and its ministries versus regional non-governmental organizations?

Participants can expect interviews to last no more than 90 minutes. Participants can refuse to answer any specific questions and have the right to end the interview at any point. Interviewees will not receive compensation of any form but they will be provided with the final results of the study. I will maintain anonymity of names of individuals or organizations if desired by the interviewee. Please inform me if your name or organization must remain confidential.

2. Rights Notice

In an endeavor to uphold the ethical standards of all SIT ISP proposals, this study has been reviewed and approved by a Local Review Board or SIT Institutional Review Board. If at any time, you feel that you are at risk or exposed to unreasonable harm, you may terminate and stop the interview. Please take some time to carefully read the statements provided below.

- a. Privacy** - all information you present in this interview may be recorded and safeguarded. If you do not want the information recorded, you need to let the interviewer know.
- b. Anonymity** - all names in this study will be kept anonymous unless the participant chooses otherwise.
- c. Confidentiality** - all names will remain completely confidential and fully protected by the interviewer. By signing below, you give the interviewer full responsibility to uphold this contract and its contents. The interviewer will also sign a copy of this contract and give it to the participant.

Participant's name printed

Participant's signature and date

Interviewer's name printed

Interviewer's signature and date