

## Managing the social dimensions of climate change in MENA: Climate change and human mobility

### CONCEPT NOTE

#### 1. Introduction

In MENA as elsewhere, climate change will impact human mobility. Individuals and households' migration propensity is influenced by direct physical processes and events (e.g. floods and droughts), as well as by indirect economic impacts (lower yields, fisheries collapse, lower water availability for tourism activities, etc). Understanding how these relationships play out is crucial: future patterns of mobility and settlement have a bearing on today's investment decisions, such as the type and spatial distribution of infrastructure investments in a range of key sectors. To this day there is no rigorous analysis of climate change impacts on future human mobility in the region. This study aims to fill this gap, and break new ground in developing new methodological approaches and providing key information to clients.

#### 2. Context and rationale

##### 2.1 MENA is going to be severely impacted by climate change

###### *Climatic trends*

By the end of the century, MENA is projected to become considerably hotter and drier. The IPCC 4<sup>th</sup> assessment report estimates an increase in temperature in MENA of up to 2 degrees by mid century, and over 4 degrees by 2100 (Fig 1) Fig 1 Increase in mean temperature and change in mean precipitation, 2100

IPCC models also predict that MENA will suffer greater precipitation losses in percentage terms than other regions, with water run-off projected to drop 20 to 30 percent by mid-century (Milly et al, 2005) (Fig.1) The combined effect of higher temperature and reduced precipitation will increase the occurrence and severity of frequent and intense extreme weather events. In North Africa especially, droughts will become more frequent and intense,<sup>i</sup> continuing the trend of recent decades (from one event every 10 years in the beginning of the 20th century to five or six events every 10 years currently (Agoumi 2003)<sup>ii</sup>.

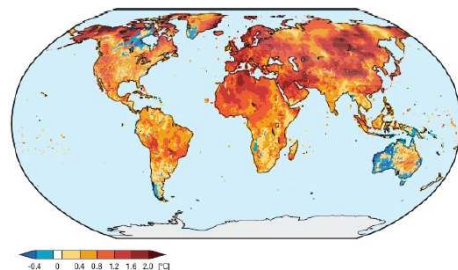


Figure 1: Linear temperature trends for the period 1974-2004. Source: WBGU , data Potsdam Institute for Climate Impact Research (PIK) climate database.

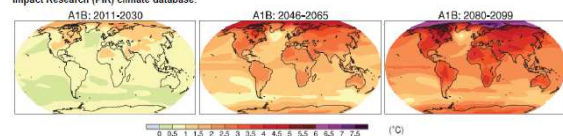
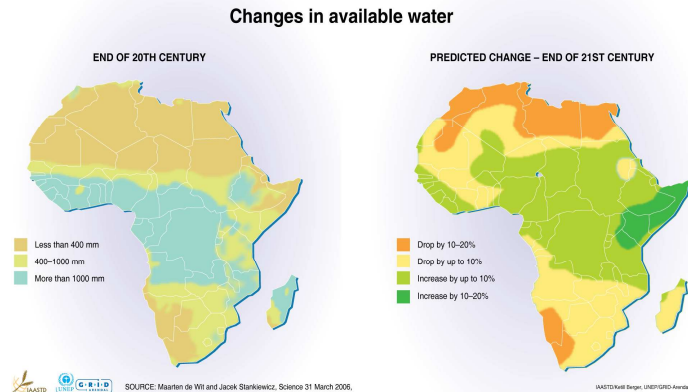


Figure 2: Multi-model mean of mean surface warming (surface air temperature °C) for scenario A1B. Source: IPCC.

###### *Direct economic impacts*

Climate change's physical impacts will directly translate in economic impacts. In several MENA countries overall growth and poverty levels are strongly dependent on agriculture and agricultural related activity. In Morocco, for example, of the total 4.2 million poor (14 percent of Morocco's population), 69 percent live in rural areas (Doudidiche et al., 2007); and most of them depend on rain-fed agriculture, making this population highly vulnerable to reduced rainfall and shifts in rainfall timing and distribution (Fig 2). With a share of 15 percent in GDP (average 2000-2005), 40 percent in employment (80 percent in rural areas), and 85 percent in total water use, agriculture is a sector of strategic significance in Morocco, from the economic, social, and environmental standpoint. Further reductions in precipitation will have an impact on both output and consumption.

Projections indicate that the value of agricultural output will decline by one fifth in the region, and by nearly 40 percent in some countries, such as Morocco (Cline, 2007). In Yemen, agriculture, contributes more than 15 percent to GDP and employs more than 55 percent of the economically active population and accounts for 93% of potable water consumption<sup>iii</sup>. In the region as a whole, an additional 80-100 million people will be exposed to water stress<sup>iv</sup> by 2025 compared to 1995 (Warren et al, 2006).



## 2.2 Climate impacts are expected to lead to changes in population settlement and movement

Although our understanding of climate dynamics and economic impacts is increasing, we still have a limited understanding of the social implications of climate change. More specifically, the lack of knowledge on how environmental degradation, climate variability and climate change may induce human mobility is worrisome.

### *Environmental degradation and human mobility*

An extensive literature (see for example, Homer-Dixon, 1991, Kates, *et al*, 1988; Clark, 1988, Biswas and Biswas, 1979) shows that environmental drivers can be responsible for human mobility. Natural as well as anthropogenic environmental changes can have notable impacts on the movement of people. either as a result of environmental constraints (e.g., food production capacity of land tenure systems) or adverse events (e.g., flash floods, chronic drought), and can contribute to migration decisions directly as well as indirectly when combined with other factors (e.g., economic, security). As climate change is expected to increase the frequency and magnitude of climate events, these studies remain relevant today. Much of the early work aims at identifying the deterministic relationships between specific climate events such as floods or droughts, and resulting population movement. The underlying goal of this research is to understand the impact of climate variability or change under a given set of social, economic, and political conditions.

A recent UNU-EHS report contains a good summary of the state of the knowledge of climate change-migration links. The report presents the following findings:

- Environmental factors are already *contributing to* migration;

- Migration occurs after certain *environmental tipping points* are exceeded;
- Government responses vary from offering “mobility incentives” to mandatory resettlement programs, with mixed results.

Furthermore, the report suggests that the pattern of environmentally induced migration is affected by at least three major factors:

- The degree to which environmental change affects livelihoods
- The degree to which relative wealth (affluence) and asset ownership affects migration (i.e. land ownership will lessen propensity to migrate).
- The severity and extent of environmental change now and in the future

### *Climate change and human mobility*

The emergence of climate change as a pivotal global issue helped to recast and elevate the status of literature focused on the likely impacts of climate change on migration flows (Lonergan, 1998; Biermann, 2001; Nuscheler, 2004; Salehyan, 2005; IPCC, 2007a; WBGU 2007, Gleditsch 2007). Nonetheless, empirical data and analysis of the threats of, and the possible solutions to climate-induced migration remains limited.

Conceptually, this literature generally relies on causal chain hypotheses focusing on climate as a push factor. This includes: a) the role of *climate processes* (decrease in precipitation, etc) in pushing environmental degradation, which in turn reduces environmental carrying capacity leading to enhanced migration flows, for instance from rural to urban areas in the case of impacts of agriculture); b) the role of *climate extremes* (cyclones, floods) in spurring sudden population movements leading to displacement or to temporary migration. Moreover, distinctions are normally made between climate-induced *voluntary* migration (such as for instance labor migration in response to the fewer economic opportunities in the agricultural sector) and *forced migration* (for instance in response to sudden or rapid onset climate hazards). However, in practice very few decisions ever entirely ‘forced’ or ‘voluntary’ (Hugo 1996 and 2008).

This literature conceives of migration as a second order climate impact stemming from processes such as reduced agricultural yield and adversely affected rural livelihoods. Generally speaking, clear-cut, direct cause-effect relationship between climate change and migration are hard to establish, except in the case of environment induced displacement from flooding.

### *Migration as adaptation*

Many scholars have attempted to conceptualize mobility as a one of the adaptation strategies available to individuals, households and communities (Barnett and Webber, 2009:21-24, Agrawal 2008). This perspective tries to recast migration from being perceived uniquely as problem to be ‘managed’ or ‘solved’ to a developmental and adaptive function. For example, migration may indeed enhance the adaptive capacity of individuals or households by expanding their social networks thereby reducing the risks associated with short-term displacement in response to crisis.

Arun Agrawal proposes five different adaptation responses, including ‘mobility’, ‘storage’, ‘diversification’, ‘communal pooling’, and ‘exchange’<sup>v</sup>. The relative strength/weakness of one or several of these will impact the preferred choice of the household – and their relative relationship needs to be assessed and understood in order of designing measures to build resilience in communities and households. Of most direct relevance to social tension/conflict and migration are the choices of ‘mobility’ and ‘diversification’. Human mobility is according to Agrawal

(2008) the most ‘common and seemingly natural responses to environmental risks’ as it reflects the pooling of risks across space, and is especially successful in combination with clear information about the spatial and temporal distribution of precipitation. While recognizing the potential for this choice as being seen as a mal-adaptation (involuntary migration), it is “*also a way of life for large groups of people in semi-arid regions and a long standing mechanism to deal with spatio-temporal variations in rainfall and range productivity*”<sup>viii</sup>.

Remittances can play a key role in strengthening the capital base of households and communities, in turn increasing their capacity to adapt to future climate hazards and related shocks. More specifically, positive effects of remittances may include: even consumption of basic needs such as food across seasons; sustained access to basic needs in times of livelihood shocks such as drought; ability to finance the acquisition of human, social, physical and natural capital; and increased demand and subsequent stimulation of the local economy (De Haan 2000, Ellis 2003). A study on Morocco for instance showed that remittances from urban to rural areas were estimated in 2004 to account for 30% of the income of the rural poor<sup>vii</sup>. Evidence shows that families with labor migrants who remit incomes fare better during livelihood crises than those that do not (Ezra 2001).

Policies to restrict migration rarely succeed, are often self-defeating, and increase costs to migrants, communities of origin, and destination communities (De Haas 2007). Many efforts to control rural to urban migration, for example, have failed to stem migration, and have restricted the opportunities for urban migrants to lift themselves out of poverty (Chapman 1991, Wu 2004). There is considerable scope for careful and coordinated policies to minimize many of the potential costs and maximize many of the potential benefits arising from migration that may be exacerbated by climate change.

#### *Migration as maladaptation*

However, human mobility is not without its costs. People who have little choice but to move lose their homes and sites that are important to them, and their jobs. Communities and families may be broken up, livelihoods disrupted, and so migrants oftentimes may become poorer in absolute as well as relative (to their host population) terms. In this sense, migration may be viewed as an expression of failed adaptation.

Ultimately, assessing the outcomes of mobility depends on the unit and metric of analysis, or the perspective taken. For example, international migration is important to growth in both developing and developed economies, but the effects of that migration on women within households that send migrants may be negative (Kothari 2003). Similarly, urban planners might perceive rural-urban migration as hindering organic urban development by swelling up peri-urban slums, whereas rural families might see it as a positive way to diversify household incomes (De Haas 2007). These considerations need to be taken into account when considering migration as part and parcel of adaptation.

#### *Related conflict and gender dynamics*

The interplay between climate change and human mobility has implications for key aspects of the social fabric, such as conflict and gender dynamics. Although there is little or no evidence that climate change *causes* intra-state conflict (Barnett 2003, Nordas and Gleditsch 2007), the capacity of climate change to exacerbate low-level conflict at the local level has been documented.<sup>viii</sup> Moreover, human mobility has been singled out as a) an adaptation strategy allowing for conflict avoidance by relieving pressure on natural resources; b) an outcome of environmental stress induced conflict; c) as a driver of conflict in receiving areas.<sup>ix</sup> An important

question for research is whether existing conflict resolution mechanisms which are functional today, such as those necessary for coping with water scarcity will be viable in a context of climate change. Climate change also poses particular risks to women, and human mobility also has an important gender dimension. Migration is not gender neutral. Male migration for instance has the potential to make women further vulnerable, exacerbating existing economic disparities, increase women's workload, disrupt activities with gender-differentiated roles, further limit women's indirect access to male-dominated or "male-access only" public and/or communal institutions. Gender is also an important factor affecting displacement dynamics (Aguillar, 2009).

### **2.3 Human mobility in MENA**

Mobility is already a prominent feature of MENA societies. This section explores some key trends in international and internal migration.

#### *International migration*

A set of mutually reinforcing push and pull factors have made international migration a key feature of MENA economic and social landscape. These include prevalence of rich neighboring regions, colonial era ties, shared culture and language, adverse seasonal environment, overall poverty, complex security matrices, cheap and flexible labor abundance, women empowerment, etc. In 2005, MENA had about 22.8 million persons living outside their country of birth (UNDESA, 2006), with a net-migration of 2.8% in the years 2000-2005, of which one third came from Egypt and Morocco. Remittances inflow from immigrants represent important sources of capital at both macro and micro levels. MENA is also experiencing sustained internal migration contributing to high urbanization rates, with countries like Morocco and Egypt expected to reach 71% and 54.4% urbanization rates in 2030 (up from 55.5% and 42.6% in 2000 respectively) (UN Habitat, 2002).<sup>x</sup>

#### *Internal migration and increased urbanization in MENA countries*

Although data is much weaker than on international migration, existing evidence seems to confirm an increasing level of internal migration in the MENA region. While having one of the fastest growing populations, MENA has also experienced rapid urban population growth over the last few decades. The urban share of the total population has grown from 48% in 1980 to 60% in 2000, and is expected to exceed 70% by 2015.

Households in rural areas have increasingly been forced to establish their income strategies on income generating activities outside the agricultural sector, i.e. as paid labor or through migration. The resulting rural employment profile for MENA in the year 2000 is accordingly reflecting that only 24.6% of men are self-employed in agriculture (38.6% for women), with 9.8% working as wage earner in agriculture (1% for women), 8.8% as self-employed outside agriculture (2.8% for women), 30.9% as wage earner outside agriculture (3.9%), and 26% as non-active or not reported (53.3 for women).

### **2.4 Without an understanding of future climate impacts on human mobility, client countries will face inadequate information bases for a range of investment and policy decisions**

A recent WB study highlighted "a growing realization, both inside and outside the World Bank, that migration represents challenges and opportunities for [client] countries"<sup>xi</sup>. Clients' current development strategies and plans do not yet take into account climate change considerations. Given the high rate of and demographic growth (2.6 percent per year 1990-2004), and an even higher urban growth rate (at an average of 4 percent per year for the past couple of decades)<sup>xii</sup>, the

MENA governments are presented with a challenge of managing a growing, increasingly urban society that is undergoing significant economic changes. The projections (economic, demographic, etc.) upon which such strategies and plans are based and the corresponding responses do not currently take into account climate change considerations even when the timeframe would necessitate this (for instance, Morocco’s strategy “Maroc 2030” of Haute Commissariat au Plan).

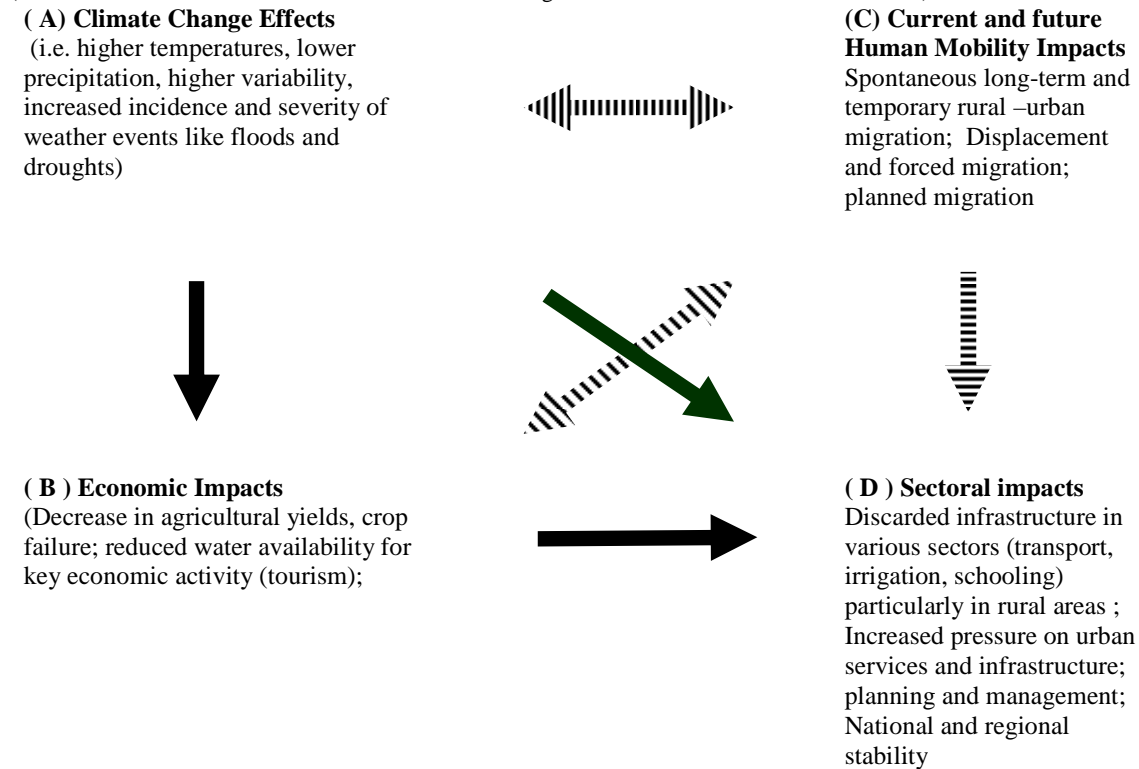
There are several reasons why today MENA countries need a better understanding of climate-mobility linkages. First, population movements might hinder development outcomes for instance by leading to worse health, educational and social indicators among migrants themselves (IOM, 2008), especially if countries find themselves ill-prepared to increased and more erratic mobility, particularly in terms of rural-urban flows and displacement episodes. Without adequate preparedness, hosting cities will have to face increasing pressure on urban infrastructure and services, and national and regional governments.

Second, failure to plan for climate-induced mobility might lead to inadequate, excess or out of place infrastructure investments (particularly in energy, transport, water infrastructure). For instance, infrastructure provision (electricity, wells, etc) is normally conceived as one of the main policy responses to rural outflow. In scenarios where climatic drivers overshadow households and communities’ settlement and mobility decisions, the sunk costs of these infrastructure investments will not lead to expected benefits.

Third, neglecting the climate-mobility link amounts to disregarding the role that migration and remittances play in the adaptation responses of communities, households and individuals, and their contribution to appropriate policy responses.

**Figure 3: Climate Change and Mobility: a conceptual impact chain**

(Broken lines indicate where research where causal linkages are less clear and research is needed )



### 3. Development Objective and Outputs

This ESW's development objective is to:

*“Provide national and local decision-makers in target countries (Egypt, Algeria, Yemen, Morocco and Syria) a better understanding of the linkages between future climate change and human mobility”, through:*

- (A) Estimated impacts of climate change on rural-urban human mobility, including both sending and receiving areas;
- (B) Scenarios related to the knock on effects that climate induced mobility will have on key sectors;
- (C) Analyses of the role of mobility, in particular of remittances, for communities and individuals;
- (D) Identification of vulnerable localities;
- (E) Recommendations for policy

The outputs will include:

- Methodology note
- Regional report
- Country reports
- Policy note

### 4. Methodology

Pushing the boundaries of our understanding of the climate-human mobility dimension involves addressing methodological and empirical gaps. One obvious difficulty is the degree of uncertainty with regards to climate change predictions, with estimates of the likely impact being constantly revised (for example, Sokolow et al., 2009, Domingues et al. 2008)<sup>xiii xiv</sup> Policy effects and societal responses add an increasing layer of unpredictability. To the uncertainty regarding climatic projections one has to add the challenges of a) isolating the weight of climatic factors from other push and pull drivers of migration; b) endogeneity of household level decisions (on consumption, investment in physical capital, human capital, adaptation measures like crop diversification, other livelihood strategies) with migration decisions; c) uncertainties regarding public and private responses (including public assistance during economic shocks and remittances sent by family and friends) in adaptation and mitigation which will in turn affect behavior including migration; d) uncertainties regarding population growth projections (IOM, 2008).

As outlined above, rigorous attempts at establishing climate-mobility links quantitatively are rare. Barrios et al (2006) for instance uses rainfall patterns as a proxy from climate change to estimate past impacts of the latter on urbanization trends in Sub-Saharan Africa. A recent analysis of climate and migration trends for LAC (WB2009) utilized census data to develop a municipality to municipality migration grid showing a strong non-linear association between internal migration and temperature/rainfall. A recent family of speculative research tries to get around data and uncertainty constraints by dealing with the question of climate change-induced migration from a largely qualitative scenario-driven and global perspective (see also Kemp-Benedict, et al 2002;

Schwartz and Randall, 2006; Gleditsch *et al* (2007)). This research can be enhanced by adding analytic rigor by relying on hard data, quantitative modeling, and by narrowing down the focus from the global to the country level. The way out of the drawbacks affecting each method is to combine different ones. This is the path followed by this study. As evident from the discussion above, a rigorous study on the impact of climate change and migration in MNA is uncharted territory and facing substantial methodological and data challenges. The study will attempt to tackle methodological challenges by combining different quantitative and qualitative approaches, and a range of data sources as highlighted below.

### 3.1 Activities and data

*Objective (A) Estimate impacts of climate change on human mobility;*

Activities:

- 1) Carry out an in-depth literature review of past mobility trends in MENA, in general and in relation to climate change variability.
- 2) Derive a typology of potential climate-related migration (long/short term, seasonal, internal / international; , explicitly incorporating different non climatic push and pull drivers; This involves among others,
  - i) Mapping migration patterns and trends in MENA
  - ii) Mapping climate change and climate variability in MENA
- 3) Identify suitable sources of data and projections related to:

- *Population movement*: Censuses, labor surveys and specific panel data will be the main sources. For example, in the case of Egypt: CAPMAS studies, the 1997 Push and Pull Factors of International Migration (PPFIM) survey by CDC and NIDI 2003; The estimate of migration flows at the governorate level between the 1986 , 1996 and 2006 censuses (also based on the analysis by Alkitkat 2000); The United Nations estimate of the “net number of international migrants” for Egypt during the period 1995-2000 (450,000 migrants) (UN 2005a); ERF 1998-2006 Migration dataset. For Morocco, Recensement Général ; Enquête Nationale sur le niveau de vie des ménages etc.

- *Poverty and consumption* : For example, for Morocco 1994 and 2004 Poverty Maps)

- *Climatic / hydro-met data* , such as for instance the African Rainfall Temperature Evaluation System (ARTES) data, as well as newly available satellite imagery and remote sensing data. In the case of Morocco, data on availability of water for irrigation is assembled in the Agro census; farm surveys (in irrigation perimeters conducted in 2000 and in rainfed areas conducted in 2006; LSMS type surveys (1998, 2006) contain relevant information on access to irrigation, farm activities, crops, incomes, non-farm income sources, and have a sufficiently large sample. There are useful qualitative data on the effects of water scarcity on different farmers in irrigation zones (PSIA 2006) and the rainfed communes (Moving out of poverty study, 2005). Specific information on *water access* is available from the authorities of each irrigation perimeter. The rationale for combining different sources of data (ground station and satellite / remote sensing) is that it allows triangulation of information across different scales (district, province, region) and types of data (moisture, water availability, temperature etc)



- 4) On the basis of the data sources outlined above, carry out a retrospective analysis of climate drivers of mobility at macro and local level ;
  - i) estimate the relationship between net outmigration; other socio economic variables and climate variables (at the lowest sub national administrative level possible, depending on data availability). Special care needs to be taken to address potential multicollinearity and omitted variable bias in estimation;
  - ii) a) simulate the impact of climate change on household incomes (or other measures of vulnerability) using household survey, farm models and available downscaled data (Data for Morocco exists. . In the absence of reliable downscaled climate data, spatial analysis identifying affected provinces and vulnerable sections could be explored); b) estimate the relationship between households incomes (or other) and net-outmigration;
  - iii) derive weight of climate drivers of migration;
  - iv) Establish quantitative measures of ‘migration tipping points’ or ‘index of climate augmented migration propensity’ at the household level and at some sub regional level based on the household level data and climate data using analysis as described before (similar to vulnerability to poverty measures widely used in the literature (Chaudhuri (2003)<sup>xv</sup>).
- 5) Validate the results with original survey work, especially on affected communities, environment induced migrants. This would use case studies ( see methodology used by EACHFOR<sup>xvi</sup> and Koko Warner et al (2008)<sup>xvii</sup>) as well as RA techniques to simulate climate change scenarios with focus groups, thus validating/triangulating the findings of the econometric work (A.4 above) and giving them qualitative depth re gender, class, social constraints on mobility etc.
- 6) Apply the results of 4) and 5) to future climate trends derived from existing exercises at (statistical/ dynamic) climate downscaling;
- 7) Map out risks and vulnerabilities of future population in terms of displacement and forced migration, as well enhanced migration propensities.

*(B) Establish scenarios related to the knock on effects of climate-induced mobility on key sectors*

- 1) Compare current urbanization and rural outflow estimates with those resulting from analysis;
- 2) Determine the extent to which current spatial development plans (mainly around urban and rural planning) are affected by the discrepancies;
- 3) Identify and apply decision-making approaches to establish policy and planning responses in contexts of uncertainty, such as those moving away from optimality and emphasizing robustness.

*(C) Analysis of the role of mobility, in particular remittances, for communities and individuals’ adaptation strategies*

- 1) Ascertain the role that direct or ‘indirect’ migration (for instance, through a family member) plays in individuals’ and households adaptation strategies (transfer of knowledge; etc)
- 2) Establish the impact of remittances on household consumption, investments and human capital accumulation, in different regions, by disaggregating regions’ climate

sensitivity of households' main economic activity (for instance household conducting subsistence farming in rainfed vs irrigated areas; etc);

3) Establish role of remittances in ex ante disaster preparedness and ex post recovery (survey of households struck by recent severe weather events (Morocco's floods) and also using household survey data.

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## End Notes

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