

# Common Property Systems, Migration, and Coastal Ecosystems

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## INTRODUCTION

Common property systems are a critical institution mediating the relationship between population change and environmental outcomes, especially in coastal and marine ecosystems. Evidence from El Salvador, Goa, India; and the Solomon Islands demonstrates how the social structures and institutions stemming from patterns of human migration variably influence environmental outcomes through their effects on common property resource institutions. In each of the case studies, the demographic phenomenon is not population growth or a change in numbers, but an underlying process that affects population size and growth rates: i.e. migration and associated social relations that result from or cause more migration. All 3 case studies provide the respective historical and cultural context to show that there is a nonlinear link between population and environment, which when explored reveals the importance of understanding how individuals and communities are embedded in sets of social relations that must be considered when evaluating environmental policies or when determining the causes of environmental degradation.

The human ecology literature on common property resource regimes, particularly the resilience of such institutions, points to the importance of understanding embedded relations. The human relationship to coastal and marine ecosystems increasingly has recognized some form of community property resource regimes predominating (1-9). Open access conditions once were assumed to prevail in marine systems, although there is a growing chorus of dissidents on this point (1, 2, 4, 8, 10-12). In fact, fishing in many locales often is regulated, with varying success by, at the very least, norms (8, 13). Pretty and Ward demonstrate the predominance of common property institutions in a wide variety of ecologically important contexts, including marine and water systems (9). The growing recognition of the prevalence of common property regimes has generated concern about the

institutions' resilience in the face of social change, their dynamics, and the varying role of local and national governance.

Migration is the hardest demographic phenomenon to observe and measure. Unlike birth and death events, which have temporal specificity, migration exhibits considerable temporal and spatial variability. Recent research has highlighted the ways in which the complexity of the process can be better understood. These include: migrant selectivity; the role of social networks (through facilitating moves, assisting with assimilation in places of destination, and maintaining ties to places of origin); the timing of a move; and the distance between origin and destination. Including these dimensions of migration in the analysis of migration's effects upon places of origin or destination highlights the social nature of this demographic process, taking analysts beyond total numbers to the embedded nature of social relations and behavior (16, 17). In this way, migration theory and evidence increasingly recognizes the importance of social networks for understanding the effects of migration upon social and environmental outcomes (14).

Migration evidence and theory thus converges with the literature on common property resource systems in its respective emphasis on embedded relationships (16, 17) for predicting variable institutional responses to environmental resource management. This convergence is particularly useful for the entire collection of case studies presented in this issue of *Ambio*. They each reveal how human migration interacts with institutions because of who the migrants are (selectivity); the ties they maintain with places of origin through remittances; and the ways in which they are related to people in places of origin and destination (through inter-marriage). Before discussing the three case studies, we briefly review common property resource institutions and the conditions under which they are required, arise, and function effectively, with a focus on coastal and marine ecosystem tenure regimes.

## COMMON POOL RESOURCES AND COMMON PROPERTY MANAGEMENT

It has been argued that common property regimes are necessarily diminished by population growth (either through natural increase or migration), and thereby population growth contributes to environmental deterioration (15). Others counter that common property resource institutions respond resiliently to the pressures of population, economy, and politics if the management tools are in the hands of local communities with the support of national governments for enforcement (4, 7). However, there has been little empirical research or theoretical motivation to examine the ways in which migration patterns may differentially affect common property resource institutions across a wide array of ecosystems, including coastal ones.

The human ecology literature finds open-access conditions rare and therefore, by implication, Malthusian predictions of population size overwhelming environmental resource quality unlikely (10, 11). The findings in this literature also argue against a solution that involves privatization or socialization (5-7, 18, 19). More solutions exist than Hardin's two extremes (20), but predicting environmental outcomes remains inherently complex.

To understand and model this complexity we must assess the embedded relationships of individuals (or communities) within social networks of relations (9, 12).

Scholars of common property resource management make explicit the distinction between the resource and the institution governing the social relations among people that affect the exploitation of the resource. For the former, common-pool resources (7, 10) are defined by 2 problems: "exclusion" and "subtractibility." In other words, exclusive use of common-pool resources is very costly, and individual exploitation reduces resource availability for other users. The latter characteristic typically is described as: a person's short-term interests in using the resources may not be in their or others' long-term interests. Common-pool resources are found in both marine and terrestrial ecosystems, are both renewable and depletable, and can be either man-made or Earth-made (7, 9).

Common property resource institutions are the formal or informal set of social relations governing human relationships within an ecosystem as they relate to resource exploitation (7, 10, 12). Common property relations govern human interaction and resource exploitation through solving the exclusion and subtractibility problems—by restricting access and creating incentives for investment in the resource base. The past decade of research reveals a wide variety of institutions (formal and informal) with varying participation of local and national stakeholders, and varying success (1, 12, 21, 22).

The "tragedy of the commons" results, not from an inherent failure associated with a common pool resource, but from institutional failure to control access to the resource, and to make and enforce internal decisions for collective, long-term use (7, 10, 12). Until recently, most policy approaches failed to recognize the formal and informal collective action of people within ecosystems, instead focusing on individual behavior and attempting to modify individual motives (9). Despite recent recognition of this failing, policymakers still are faced with the dilemma of accomplishing a balance among individual, community, and national interests of cooperation and conflict (12).

Recent research has demonstrated the importance of social bonds among people reinforcing normative behavior and expectations (7, 23, 24). Pretty and Ward demonstrate that the social bonds among people enhance collective capacity to manage watershed/catchment areas, agricultural irrigation, forests, integrated pest applications, and farmers' research (9). Katz (25) demonstrates that communities in which social bonds have been disrupted through migration into the community by "outsiders" are less likely to have the capacity to take collective action for long-term natural capital enhancement (25). Implicit in much of this research is that social bonds are diminished through migration because it disrupts the social bonds of reciprocity and trust that are required for collective action.

Typically, migration into an area is presumed to weaken the social bonds there. This appears to be the case in examples from Guatemala (25), Ecuador (26), Mexico (27, 28), the Himalayas (29), and Brazil (30, 31), where movement into a community not only puts added pressure on resource extraction, but diminishes trust, reciprocity, exchange, and social bonds (7). However, this is not always the case. In Indonesia, transmigrants clear half as much forest as spontaneous migrants because, by implication, they have greater collective action capacities through greater embeddedness in political and social institutions at all levels (26). In Ethiopia, particular property systems are deployed to attract migrants to communities (32). Further, migration out of a community may serve to embed an origin community more effectively, enhancing capacity for long-term resource management (1, 32).

There is much variability in the success of common property management regimes (7). Evaluating success or failure of marine resource management is hampered by the fact that meas-

urement of coastal ecosystem viability or sustainability requires intensive longitudinal observation across wide-ranging spatial areas on a scale much larger than that of terrestrially-based ecosystems (33). Furthermore, there has been no systematic analysis of how demographic processes affect common property resource regimes (or *vice versa*) through embedding processes. The preceding case studies from El Salvador; Goa, India; and the Solomon Islands provide evidence for how migration might variably relate to common property resource institutions and environmental outcomes.

## MIGRANT SOCIAL RELATIONS AND INDETERMINATE ENVIRONMENTAL OUTCOMES

Two questions must be answered to refine our understanding of how migration affects the environment: Which migrants have access to which resources? And, how are these migrants embedded in the set of social relations defining ecosystem use in a place of destination?

The first question addresses a longstanding concern of migration scholars, that of selectivity. To understand both the causes and consequences of migration—whether they are environmental or not—researchers must examine the selection processes that include or exclude people from becoming migrants. The second question addresses recent theoretical concepts of social networks and embedded relationships (16, 17), which can be used to generate hypotheses that predict positive or negative environmental outcomes in a given context, or system of property relations. A recent summary of findings from the empirical literature shows that: *i*) the selective nature of migration affects environmental outcomes, including variability in the type of migration; *ii*) environmental considerations at both places of origin and destination can serve as push or pull factors respectively (highlighting the reciprocal character of the relationship); *iii*) remittances back to places of origin may play an important role in redirecting consumption in either positive or negative ways for environmental outcomes; and, *iv*) migration affects the environment through social and economic institutions, such as land or sea tenure and poverty (14).

The 3 preceding case studies offer some evidence about these 4 dimensions of the migration process. The Goa, India, case demonstrates how selective in- and out-migration changed social relations and the value of ecosystem services to the local population, and consequently changed ecosystem management systems in the tidal plain. The El Salvador and Goa cases also demonstrate how remittances change consumption and investment decisions, with direct effects on the environment. The El Salvador case also shows how social and environmental disruption can push people out of a locale. Finally, in the case of the Solomon Islands, migration patterns facilitated through marriage served to cohere sea-tenure regimes in places of origin and destination for one group of islanders, and results in the preservation of environmental quality. Whereas in another context—in which migration is not associated with high rates of intermarriage linking origin and destination communities, and migrants come from many disparate places—then sea-tenure regimes are challenged with detrimental environmental results.

Selective out- and in-migration changed social relations concerning ecosystem management in the coastal tidal plain of Goa, India (34). Before Goa was developed its coastal tidal plain was comprised of a relatively complex set of land use relations employing multi-use approaches to land resources, fresh water, and brackish tidal water to grow rice and coconuts, farm fish, and pan salt. Historical variability of migration patterns also defines the context in Goa. In the early 20<sup>th</sup> century, Goa was characterized by out-migration to British India and Portuguese colonies in Africa. After independence from Portugal in 1961, Goa experienced a surge of return migration. Then, in the 1970s there was selective out-migration of young men (both single and mar-

ried) to the gulf state nations. Simultaneously, Goa's beaches and low cost of living were "discovered" by low-budget tourists. The combination of selective out- and in-migration redefined land use along the coastal tidal plains. Limited male labor for maintaining the complex irrigation system, as well as remittance income from male migrants, supplemented livelihoods and shifted production and consumption priorities. Incoming tourists and associated migration of service sector labor and capital also shifted relative use values of land. The result has been a decline in paddy land, fish ponds, and salt flats, and an increase in housing construction. What this means for ecosystem health, particularly pollution and effluent management, has not been evaluated. Nevertheless, selective patterns of migration are critical for understanding the relationship between migration and land-use change.

The Solomon Islands have exhibited a wide variety of sea tenure regimes, and 2 are highlighted in the case study (35). Contrary to predictions, open-access conditions or privatization are not the default outcomes resulting from population growth and increased consumption. Rather, each sea tenure regime has responded to the pressures of population growth differently depending on the degree to which individuals are socially embedded and interrelated; in particular, the combination of migration, social networks, and rates of intermarriage. When migration combines with intermarriage to create nucleated settlements in which members share common values regarding ecosystem services, fishing efforts are rewarded at a higher rate than when settlements are dispersed and members come from divergent backgrounds with differing value systems. In the latter case, the sea tenure regime rapidly moves toward a *de facto* open-access system because of the weak social ties binding individuals and weakening the ability of the community to sanction fishing deviants. The roots of how settlements became nucleated or dissipated are found in the patterns of migration, whereas in the former case, migrants moved to the settlement through marriage. Migration in the former case was not facilitated by marriage, but through a wide array of reasons.

In El Salvador, mangrove forest cover has fluctuated dramatically during the past 30 years. Recently, after rebounding during the 1980s, mangroves have experienced higher deforestation rates, reaching diminished forest cover levels not seen since the 1970s. The analysis shows factors associated with higher rates of fuel wood consumption, thought to be one of the key reasons for mangrove forest loss. Intriguing findings include the negative association of remittances for fuelwood consumption, i.e., they suggest that out-migration and remittances relieve pressure on mangrove forests. Remittances serve to mitigate the need for firewood, implying alternative fuel substitution because of additional income. However, these effects may be counteracted by evidence that out-migration may have occurred in areas in which there was significant conflict during the 1980s civil war. This disruption of social relations is confounded by significant and selective out-migration of men from households. The loss of male maintenance of social relations that govern common property resource use, and the increased likelihood that the women remaining behind are more likely to be in poverty, also appears to increase mangrove fuel wood consumption. Unfortunately, the results from the analysis do not provide enough temporal depth to tease out the clearly complex set of social relations governing household use of mangrove resources (36).

In all 3 case studies, ties between places of origin and destination; environmental and social disruption that pushes migrants out of a community; and remittance income (ties back to places of origin) work in different ways to affect the social bonds necessary to maintain common property resource regimes. The evidence is relatively inconclusive for El Salvador, but more clear for the Goa, India, and Solomon Islands cases. In all, it is clear that open access conditions are not a necessary result of population growth, especially growth resulting from migration.

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