

**Land Tenure, Land Use,  
Environmental Degradation and  
Conflict Resolution: a PASIR  
Analysis for the Narok District,  
Kenya**

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## **Abstract**

The origins of many conflicts in parts of the developing world can be traced to disputes over land – over land ownership, rights, access, use and degradation. In this paper, we test the hypothesis that information asymmetries among various principals in land tenure and market systems have caused the marginalisation of some principals by others, leading to confrontation and, frequently, violent clashes. We begin by observing the interdependencies among the various principals in the Narok district in Kenya, which has been the scene for prolonged social unrest over the last decade. A PASIR (Pressure, Activity, State, Impact, Response) framework is developed to model the causality links among the principals in the district that may provide an explanation for these conflicts. Preliminary results suggest that a lack of understanding of new institutions for land tenure, land use and market exchange by some groups in the area often lead to their exploitation and marginalisation by the rational choices of other groups who are more informed. The drop in social welfare levels together with widening equity gaps and degradation of the resource base they depend on for their livelihood may provide a more rational answer to the conflicts than just ethnic differences.

## **Abrégé**

De nombreux conflits affectant certaines régions du monde en développement trouvent leur origine dans des litiges fonciers, qui peuvent concerner la propriété foncière, les droits fonciers, l'accès aux terres, l'usufruit et la dégradation. Dans ce document, nous mettons à l'épreuve l'hypothèse suivante : les déséquilibres informationnels entre différents groupes humains concernés par des tenures foncières et des systèmes de marché ont provoqué la marginalisation de certains de ces groupes par d'autres, aboutissant à des confrontations et souvent à de violents affrontements. Pour commencer, nous observons les liens d'interdépendance entre les différents ayants droits du district de Narok (Kenya), lieu, depuis une dizaine d'années, d'une agitation sociale prolongée. Un cadre analytique PAEIR (Pression, Activité, État, Impact, Réaction) est élaboré pour modéliser les liens de causalité entre les groupes d'ayants droit du district, afin de fournir une explication de ces conflits. Les résultats préliminaires suggèrent que si certains groupes de la région ne parviennent pas à comprendre les nouvelles institutions foncières nouvelles (tenure et utilisation des terres et échanges passant par le marché), cela aboutit fréquemment à leur exploitation et à leur marginalisation dues aux choix rationnels effectués par d'autres groupes, qui sont eux mieux informés. La chute de leur niveau de bien-être social, ainsi que l'accroissement des inégalités et la dégradation de la base de ressources dont ils dépendent pour leur survie, risquent fort de fournir une explication plus rationnelle de l'origine des conflits que de simples différences ethniques.

## **Resumen**

Los orígenes de muchos conflictos en algunos países en vías de desarrollo pueden ser atribuidos a disputas sobre la tierra (su propiedad, derechos, acceso, uso y degradación). En esta monografía se pone a prueba la hipótesis de que diferencias en el acceso a la información sobre tenencia de la tierra y sistemas de mercado han causado la marginalización de aquellos que no pueden acceder a dicha información por aquellos que si lo pueden, hecho que ha conducido a enfrentamientos, a veces violentos. La monografía estudia el caso de Narok en Kenya, el cual ha sufrido una etapa prolongada de agitación social en la última década. Con el objeto de encontrar una explicación a las causas de los conflictos entre los diversos grupos, se ha elaborado un marco PAEIR (Presión, actividad, estado, impacto, respuesta). Los resultados parciales obtenidos hasta ahora sugieren que la falta de comprensión por parte de algunos grupos acerca de nuevas instituciones de tenencia de la tierra, uso de la tierra y cambios en el mercado, los pone en una situación de desventaja frente a aquellos que, gracias a un mayor acceso a la información, pueden tomar decisiones racionales al respecto. La caída en el bienestar social, el aumento de la brecha entre clases y la degradación de recursos de la cual derivan su subsistencia pareciera ofrecer una explicación más adecuada acerca de las causas del conflicto que diferencias de tipo étnico.

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# Introduction

The origins of many conflicts in the developing world can be traced to disputes over land. Conflicts over ownership, access, and rights of use to land are symptomatic of the social unrest which has plagued countries such as Guatemala (Murga, 1997), Nicaragua (Powelson and Stock, 1990), Kenya (Kanyinga, 1998; Okoth-Ogenda, 1996), South Africa (Bullard and Waters, 1996), and India (Conroy et al, 1998). They are also a response to the increasing control of economic and political institutions by a small elite and privileged class, the degradation of natural resources and the widening inequality and poverty among certain communities which usually results from these disagreements.

The precise nature of these disputes is still unclear but an evolving theory on institutional failure and information asymmetries among communities is beginning to emerge (Bates, 1989, 1995; Ensminger, 1997; Libecap, 1989; Migot-Adholla et.al, 1994; North, 1995). This literature traces the evolution of land tenure and land use systems since colonial times when indigenous and communal land ownership was replaced with private ownership systems, and where the best land was reserved for the colonists. The new land institutions together with the introduction of a market to provide an efficient exchange mechanism for new cash crops, eroded local communal societies and the rules which regulated and monitored land ownership, use and exchange in the past.

Following independence, the new governments redistributed the land previously owned by the colonists among the local population. While some programmes distributed land equitably, others paralleled the colonists' system which favoured the elites. In many cases more equitable programmes gave way to privilege and elites bought out the poorer landowners, usually at prices far below the 'market' price. Many of the former landowners either moved to the cities in search of employment or into marginal agricultural areas where the increased pressure on the land precipitated a process of land degradation. The dual processes of social exclusion and environmental degradation have culminated in increasing levels of absolute as well as relative poverty.

The debate on poverty and environmental degradation linkages has been controversial. One theory claims that poverty is a direct cause of environmental degradation (Jalal, 1993), while another emerging school of thought argues that the poor do not have the resources or the means to cause environmental degradation (Somonathan, 1991). The lack of consensus suggests that the relationship is far more complex, involving a web of interlinked processes, influences and impacts (Duraiappah, 1998). The challenge is to unravel this web and identify the fundamental forces governing its complexity. This paper is a response to this challenge. In this study, we propose to shed some light on the factors which impact on the complex relationship between institutions, poverty, inequality and environmental degradation, and to propose some possible policy solutions. In many cases the nexus is locally specific; hence we conducted our analysis at a district rather than at the national or regional level.

The paper is structured as follows. The following section presents the PASIR analytical structure. We then provide an historical overview of the relationship between institutions, environmental degradation and poverty among different groups of people in the Narok district in Kenya. In Section 4, the PASIR framework is used to analyse the nexus in the District, and

a synopsis of the results is given in Section 5. In section 6, a brief discussion on some possible policy recommendations is presented.



# The Analytical Framework

The Pressure, State, Impact, Response (PSIR) analytical framework (OECD, 1994) is used as a starting point for the structure we develop for this study. However, we extend the basic model in three ways to accommodate the various demands of this study. In order to shed light on the poverty-environmental degradation nexus, first, it is critical to identify and differentiate the various individuals or groups who play a significant role in the nexus. For this purpose, we introduce the socioeconomic activity component. Second, it is important to observe changes and impacts not only in the ecological system but also in the economic or human system. In order to capture these changes, we introduce socioeconomic states and impacts. In fact, what we really want to observe is the **WHO, WHAT** and **HOW** – who is responsible for what changes and how these changes were initiated.

Figure 1 illustrates how the various components in the modified framework, Pressure, Activity, State, Impact, Response (PASIR) operate in a dynamic environment of feed-forward and feedback causality relationships. In order to understand fully the unique strengths of the PASIR system, we provide a brief description of the various components followed by a detailed analysis of the various links and how they interact with each other.

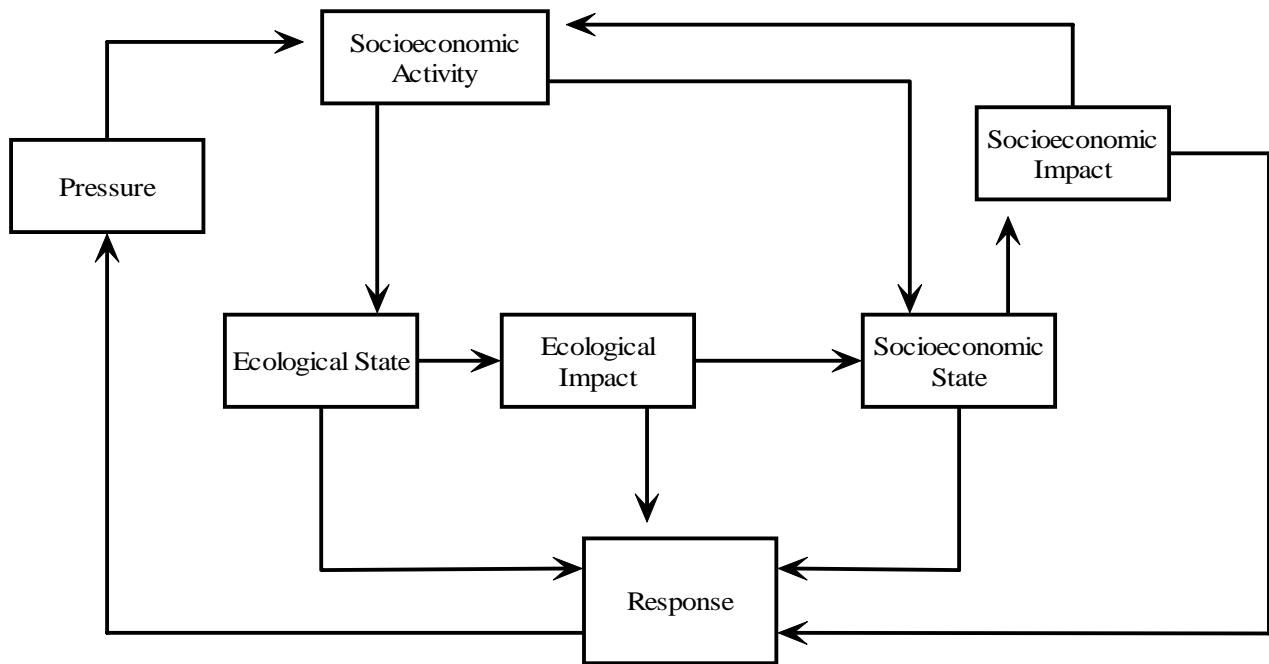


Figure 1. The Pressure-Activity-State-Impact-Response (PASIR) framework

**Pressure**<sup>1</sup> points in our framework are the driving forces, which have an impact on both ecological and/or socioeconomic states through socioeconomic activities. For example, a tax subsidy for forest clearing is an example of a pressure point that may cause a reduction in forest cover, ie, a change in ecological state. However, this same pressure point may cause a rise in income for some socioeconomic groups, ie, a change in the socioeconomic state.

**Socioeconomic activity** is introduced for a number of reasons. First, if a pressure point is applied, any changes in the ecological state can only come from economic activities. For example, the tax subsidy policy mentioned above cannot by itself cause a decrease in forest cover. It is the economic activities, ie, excessive forest clearing encouraged by the policy that causes degradation.

Second, by including socioeconomic activities we can differentiate the degree and type of activities set in motion by different groups of principals in the economy. This is a crucial dimension necessary for the analysis of the nexus because it helps us to attribute responsibility and accountability for changes in the ecological states to the appropriate groups.

**Ecological states** are intended to reflect the characteristics of the ecological systems under study. The primary challenge faced in this category is the selection of indicators to highlight changes in the ecosystem. In the example used above, the number of trees per square unit area may be a suitable indicator to show changes in the forest cover.

**Ecological impacts** are very closely linked with the ecological states. Again, the choice of indicators is crucial. The indicators must be closely related to those used in **ecological states** and the causal relationship between them must be clear. One particular ecological impact closely linked to forest cover that is important and has significant impacts on the economic system could be floods or the frequency of floods.

**Socioeconomic states** is another category we introduce into our modified PASIR model. It plays a very similar role to that of ecological states. Its primary purpose is to monitor the level of a system, in this case, the economic system. Again, the choice of indicators is crucial and largely dependent on the nature and purpose of the study.

**Socioeconomic impacts** is the final new addition to our modified framework. This category is a natural extension to the socioeconomic states. Changes in socioeconomic states by themselves do not say much, but the actual impacts they have on the socioeconomic system demonstrate the significance of any changes.

**Responses** are societal reactions to changes. In principal there are two types of responses, formal and informal. The response category shown in Figure 1 shows only formal responses. Informal responses are captured explicitly by the feedback relationship between socioeconomic impacts and socioeconomic activities. Informal responses are primarily reactive behaviours on the part of individuals to changes in their environment, which in this case is described in terms of the socioeconomic states and consequently the socioeconomic

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<sup>1</sup> Although there is some degree of consistency with the PSIR of the OECD, slight modifications to some of the categories were made in order to make it more appropriate for this study.

impacts. Formal responses, on the other hand, are classified as official reactions on the part of governmental agencies.

We now turn our attention to the causality dynamics underlying the PASIR structure. We begin by looking at the socioeconomic activity box in Figure 1. Two forces can have an effect on socioeconomic activity – pressure points and socioeconomic impacts. The former is relatively straightforward. It captures the responses of the various principals to policy initiatives. For example, an agricultural crop price subsidy may provide the incentive for farmers to grow a particular crop. The socioeconomic impacts, on the other hand, are slightly more complex, as they are caused by changes in the socioeconomic states. An example of a change in socioeconomic state is a drop in income levels. The corresponding socioeconomic impact is poverty if the drop in income levels causes the person to fall below the poverty line. The socioeconomic impact, in this case poverty, then sets in motion certain socioeconomic activities (see Section 4) which are expected to help counter the drop in income levels, i.e. the initial change in socioeconomic state. This cyclical causality link presents the first form of a feedback loop.

As there are two forces driving the socioeconomic activities, so there are two forces coming out of the socioeconomic activity box. One is the causality link between socioeconomic activity and ecological states and the other is between socioeconomic activity and socioeconomic states. Let us follow the cause-effect link between socioeconomic activity and ecological states. The important point to keep in mind here is to make the distinction between changes in the ecological states caused by socioeconomic activities driven by pressure points as opposed to socioeconomic activities driven by socioeconomic impacts. But this information has already been gathered at the last step described in the paragraph above.

Once the changes in the ecological states have been documented, the next step is to identify the ecological impacts caused by the changes in the states. When the ecological impacts have been documented, the following step then involves linking the ecological impacts to their effects on the socioeconomic states. This now brings us to the socioeconomic states node.

As Figure 1 illustrates, two forces can have an effect on socioeconomic states. These are 1) the ecological impacts described in the previous paragraph; and, 2) socioeconomic activities. This now brings us back to the second causality relationship emanating from the socioeconomic activity node. Again, it is important to make a distinction between socioeconomic activities driven by pressure points and socioeconomic activities driven by socioeconomic impacts. Once these have been differentiated, we then need to sort out the effects of the socioeconomic activities from those of the ecological impacts on the socioeconomic states. With the socioeconomic states documented, we can proceed to trace the effects that changes in the socioeconomic states have on socioeconomic impacts and the subsequent causal relationships that these impacts have with socioeconomic activities, and thus the cyclical relationship repeats itself.

The last link in the causality chain the response category. Figure 1 illustrates four ways in which responses can be triggered: the first is a direct response to changes in the ecological state; the second is initiated from impacts as a result of changes in the ecological state; the third response is to changes in the socioeconomic state; and, finally, the fourth response is to the socioeconomic impacts.

A response triggered by changes in ecological states can be considered as a reaction primarily driven by altruistic reasons. The primary reason for such a reaction is that no changes in the ecological states are either desired or wanted for themselves. A response at this point does not even imply an ecological disaster because, for example, the removal of forest cover does not by itself necessarily constitute an ecological disaster. It is the ecological impacts caused by these changes which are relevant in deciding if a policy response is necessary.

This brings us to the second point of departure for a response. Ecological impacts caused by changes in ecological states present a much stronger argument for policy intervention. For example, forest cover reduction can cause a loss in biodiversity or an increase in the frequency of floods. But a response to these ecological impacts is primarily driven by ecological considerations alone. No economic considerations come into play at this point.

The third type of response can be triggered by changes in socioeconomic states. Using our earlier example, this could be a response to falling income levels that result from the occurrence of floods or loss of biodiversity. But the question to ask here is whether any reaction is necessary in these economic circumstances? Falling income levels by themselves do not say much and justifying a policy response to declining income may be difficult both socially and economically.

It can be argued, therefore, that it is the fourth type of response, ie, the socioeconomic impacts caused by these changes in income levels, that is critical outcome. If diminishing income levels lead to some or all people falling into poverty, then a response may be justified on both social and economic grounds.

We do admit that the PASIR framework does not provide a simple and transparent mechanism to observe the driving forces behind the poverty-environment nexus. In fact, the three additional components complicates the analysis further. However, in spite of this, we believe that the PASIR framework does provide a useful structure for analysing the key relationships in the poverty-environmental degradation nexus. In order to test this extended framework, a case study undertaken in the Narok District in Kenya is now discussed. We begin with an overview of the problem in the district followed by a categorisation of the principals, pressure points, ecological states, ecological impacts, socioeconomic states, socioeconomic impacts pertinent to the study. A PASIR analysis is then carried out.

## **A General Overview of the Narok District**

The Narok District was chosen as the case study for several reasons. First, the district has been the scene of continued violent clashes since 1993. Many reasons have been cited for these conflicts but they all point to disputes over land tenure, land use and environmental degradation. Rutten (1992) mentions growing discontent by pastoralists in the area over restricted access to what were previously common lands. This has been compounded by a widening equity gap between pastoralists and other principals in the district, and a higher incidence of poverty among their group. These conditions are conducive for social unrest.

However, data from the 1994 Welfare Monitoring Survey II (WMS II) seem to contradict these assertions (CBS, 1996). The monthly income level observed in the district was one of the highest in the country; moreover the number of pastoralists estimated to be in the district was a paltry two percent of the total district population (ibid). However, closer scrutiny of the data presented in Survey highlight a number of discrepancies. First, the survey reports pastoralism as a minor activity, but goes on to describe the district as primarily a pastoral area. The Narok District Development Plan on the other hand reports approximately 58 percent of households in the district as pastoralists (RPD, 1997). Second, the largest occupational sector in the survey for the district was subsistence farmers but the high-income levels reported were far higher than the norm for this group. Third, the largest source of income in the district was from wages/salaries and profits and not from agricultural income as we would have expected. These discrepancies highlight the need for an investigation into the real causes of the conflicts.

The main disputes to date have been between the indigenous Maasai pastoralists and the subsistence immigrant farmers in the highlands (Okoth-Ogendo, 1996; Shipton, 1988). The immigrants, due to their low income and social status have been the obvious targets and have borne the brunt of the Maasai pastoralists frustration and anger. Although at first glance it would seem that the conflicts were ethnic based, a similar conclusion can be made based on occupational differences. Although some Maasai have adopted farming, most farming activities are concentrated among the women while most of the males are still occupied in pastoralist activities (CBS, 1996). The problem definitely requires a more detailed analysis.

## A PASIR Analysis

In order to investigate if there are strong relationships between poverty and environmental degradation in the Narok District in Kenya, we now conduct a PASIR analysis for each of the respective principals active in the District. In this way, we hope to answer the three questions of Who, What and How, and in the process shed light on the dynamics of the poverty-environmental degradation nexus.

Commercial large scale farmers operate in both the highlands and the plains. The highlands are characterised by rich volcanic soils with high rainfall and have been defined as high potential areas (Jaetzold and Schmidt, 1983; Short and Gitu, 1990). The plains on the other hand are less fertile with lower rainfall distribution patterns. These are classified as mid to low potential areas (ibid). In the highlands, the farmers own the land on which they grow their crops. The highlands were part of the first wave of land titling programmes in the 1950s and 1960s and individual titles were given to the Maasai pastoralists. The privatisation of land and the provision of individual titles created a land market, whereby sales and purchases could take place (Hunt, 1996). Over the next couple of decades, the pastoralists<sup>2</sup>, newcomers to land ownership and titles, willingly sold these lands to the commercial farmers. The consequences of their actions surfaced many years later and we will trace these effects when we analyse the economic activities of the pastoralists later in this section.

### Commercial farmers

For the commercial farmers, changes in the land tenure system coupled with a collusive agricultural policy of price fixing and secure demand (Bates, 1983), provided strong incentives to move into the highlands and convert large tracts of forest into wheat, barley and dairy farms. The commercial farmers (primarily European, Asian and the educated Maasai) who had extensive experience of farming knew the importance of land ownership and took every possible opportunity to acquire land (Bates, 1989: 30-31; Ensminger, 1997; Haugerud, 1983).

Driven by the pressure points - government agricultural and land tenure policies - the direct impact of the socioeconomic activities was an improvement in the socioeconomic states of commercial farmers (Coldham, 1982b). As the Narok District Development Plan plainly states, "the income from the commercial farms are impressive but none is reinvested back in the district because most of the investors are from outside the district" (RPD, 1997).

The various land uses in the highlands set in motion changes to two of the ecological states: forest cover declined rapidly and water catchment areas disappeared (Weekly Review, 1993: 15-17; Dietz, 1996). The impacts of changes to these ecological states were the following. First, excessive deforestation removed much of the soil cover in the highlands, which resulted in heavy siltation downstream and increased the frequency and intensity of floods in the district. Second, the reduction of catchment areas has reduced the level of water reaching the plains downstream (ibid).

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<sup>2</sup> We shall use the term pastoralists and Maasai pastoralists interchangeably. Although some mixed farmers keep livestock, they are few in number and moreover practice sedentary husbandry.

In the lowlands<sup>3</sup>, a slightly different picture emerges. By the early 1980s, the pastoralists displaced from the highlands moved down into the plains on a more permanent basis. The government, in response to increasing calls by the Maasai pastoral community to prevent further land grabbing, enacted the Group Ranch Policy in the late 1960s. This system gave collective ownership of land to a Maasai community rather than individual titles as in the highlands. By enacting group ranches, policymakers hoped to discourage the sale and purchase of land (Coldham, 1982a; Halderman, 1972; Hedlund, 1971). To overcome the obstacle to land access, commercial farmers resorted to leasing options (Hamilton, 1988), to which the Maasai pastoralists readily responded for a number of reasons. Firstly, their welfare levels had dropped since being displaced from the highlands and the lease options provided a quick and easy relief to their destitution. Secondly, leasing the land retained ownership among the Maasai, and thus reduced the fear of displacement. Third, agreements with the farmers allowed them to keep their livestock at the periphery of the farms during the growing season, with open access after harvesting.

However, farmers leasing land had no incentive to conserve it. In many instances, a practice of 'mine and shift' was adopted (Hesse, 1996; Norton-Griffiths, 1995; RPD, 1997). This practice involved intensive land use practices for a couple of years, after which the farmers moved on to new plots. This behaviour was further encouraged by the absence high fixed capital costs, as most of the equipment was rented at relatively cost effective rates.

The ecological states of land quality and water in the plains came under pressure. Two forces caused degradation in these resource bases. First, the mine and shift activities by the commercial farmers had started to create 'dustbowl' conditions. Second, the pastoralists, still with large herds but driven into ever smaller areas, inevitably began to overgraze the plains (RPD, 1997). The water resources in the plains also came under increasing pressure as economic activities increased and the supply from the highlands decreased (Dietz, 1996). The impacts of these changes on the ecological states have been relatively straightforward. First, primary biomass species changes resulted in a reduction of palatable forage for livestock. Second, continuing land degradation provided lower crop yields in the long run. Third, dwindling water resources ultimately led to higher livestock mortality rates and incidences of crop failures.

These ecological impacts have varying degrees of influence on the socioeconomic states of the various principals involved. The commercial farmers will see a reduction in their profits if they continue with their present mine and shift practices. Inevitably, there will come a time when they will run out of productive land. Moreover, lands in the plains do not have the same resilience as other land types to regenerate if left fallow. But the prospect of land being left fallow is small as the pastoralists have no option but to use the lands for their livestock, which are already suffering from a shortage of forage and in danger of being decimated. Both the commercial farmers and the pastoralists stand to lose from the impacts. The only difference is in intensity and time. Many of the commercial farmers have the resources to buffer themselves in times of crop failures. Moreover, these farmers have a diversified base of economic activities, which reduces their vulnerability. The pastoralists on the other hand do not have these options and will inevitably suffer the most. these impacts.

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<sup>3</sup> We use the term lowlands and plains interchangeably in this paper.

One response is to changes in the ecological state, i.e. land degradation. Using the example of the highlands, a possible response strategy is to convert the group ranches into individual titles and allow the farmers to purchase these lands. This would, in theory, provide the incentive for the farmers to adopt conservation farming practices. It would also prompt a more prudent use of the water resources in the district. But while this may reduce the degradation, it may cause perverse effects on the socioeconomic state of the pastoralists. We shall elaborate more on this later when we analyse the PASIR for the Maasai pastoralists.

### **Small and subsistence farmers**

Small farms and those for subsistence are primarily run primarily by immigrant farmers and are located in the highlands. Many of them grow a combination of cash and food crops together with some livestock. A majority own their own parcels of land, primarily purchased from the pastoralists during the first wave of government privatisation. Three factors provided the incentives for these farmers to purchase land in the highlands. The first was the prospect of abundant cheap and high potential land. The second was the secure markets with stable demand provided by the NCPB. Finally, increasing population pressures in other parts of Kenya have caused an exodus of migrants into the region.

The immediate effect of these pressures was an improvement to the small farmers' socioeconomic states. However, unlike the commercial farmers, they were usually working at the margin. Inefficient land markets prevented many from actually holding land ownership deeds (Birgegard, 1998; Shipton, 1992). This, coupled with irregularities in the land market, meant that small or subsistence farmers could not gain access to credit to supplement their production potential, and many have not been able to move beyond the poverty line. A household survey carried as part of our study reveals that a majority of these farmers obtain approximately 30% of their total income from sources outside the district (Ikiara, 1998). This finding may explain the large source of income from salaries/wages/profits reported in the household survey carried out by the CBS (CBS, 1996).

There is less evidence of land degradation among small farmers, however, as in the case of commercial farmers in the highlands, land clearing has caused siltation problems downstream. Nevertheless, the impacts are offsite and these farmers do not face any significant changes to their socioeconomic states from these impacts. On the other hand, socioeconomic activities by the pastoralists in the form of communal disturbances and claims to land titles are expected to have very serious consequences for their socioeconomic states.

Responses in the case of the small farmers would stem directly from the changes in their socioeconomic states. These changes are caused by various factors. The first response would be to improve land tenure security and make it possible for these farmers to use their tenure to gain access to credit and markets. The other response would be to curtail the disruptive socioeconomic activities of the Maasai pastoralists, i.e. riots and civil disorder that are directed at the immigrant farmers. However, the latter response would require a thorough analysis of the economic activities of the pastoralists in order to identify the root causes of their activities before any responses can be formulated.

### **Tour operators**



Tour operations are primarily large enterprises owned either by foreign companies or Kenyan individuals from outside the district. The major pressure point influencing tour operators' activities is the growing pressure on the government by both domestic and international environmental bodies to set aside large tracts of land exclusively as nature reserves. This pressure has in turn encouraged tour operators to lobby for permits to use the reserves for eco-tourism. The status of the Maasai Mara as a world-renowned game reserve has resulted in tour operators enjoying large increases in tourism revenue. A typical profile of the tour operator is a rich and well-positioned, urban-based individual in Kenya or a foreign operator from a developed country. Many of the operators employ very few of the indigenous population other than for cultural demonstrations for tourists.

The ecological impact for tour activities is indiscriminate use of the reserves. The uncontrolled number of tourists and vehicles in the reserves has caused substantial damage to the fragile ecosystem. Unless restrictions are imposed on the tourist traffic in the reserves, the habitat is likely to experience severe degradation. The tour operators themselves are not likely to initiate a response as their socioeconomic conditions have improved as a result of the exclusive policy for nature reserves. At the moment, the tour operators use the reserves in an open access manner. On the other hand, the negative ecological impact caused by the tourism industry will force policymakers to pass regulations restricting tourism access to the reserves. This will in principle convert the reserves from an open access system to a common property system with formal rules governing the use of the commons. The policy will inevitably lower the revenues of the tour operators but it would be highly unlikely if this will cause any of them to fall below the poverty line. However, the benefits to tour operators come largely at the expense of the Maasai pastoralists. In the past, the Maasai used these lands for their livestock but coexisted with the wildlife. But with the exclusion of their livestock from these lands, they have lost another buffer for their livestock especially during critical periods such as drought.

### **The Maasai pastoralists**

The Maasai are the indigenous inhabitants of the District. They are nomadic pastoralists who traditionally moved their herds between the plains and the highlands. The highlands provided the critical buffer during the dry season while the plains were used in the wet season (Dietz, 1996). With this practice of transhumance, the intensity of land use was both spatially and temporally distributed and the problem overgrazing any particular piece of land rarely occurred. In Maasai culture, land is perceived as common property to be used by all members of the tribe and cattle are looked upon as wealth.

The pressure points which have had the greatest impact on the Maasai have been the land reforms. After independence, in addition to the general objectives of wealth creation and increasing agrarian output, the government's land reform schemes aimed to sedentarise the Maasai's nomadic lifestyle (Dickerman, 1989). It was assumed that pastoralism generally and nomadic pastoralism in particular was an inefficient use of land (Galaty, 1980; Okoth-Ogendo, 1996). Hence, the programme began with the titling acts for land in the highlands.

However, efforts to change the economic activities of the Maasai to sedentary agriculture failed. Instead the Maasai sold the land they owned to outsiders. Ironically many Maasai families sold in exchange for livestock even though this reduced their access to land as their herd sizes increased (Rutten, 1992). To explain this apparently irrational behaviour,

anthropologists suggest that the Maasai believed that the land they sold would still be available for their livestock during the critical periods. (Bruce, 1988). Another reason could be the customary 'host-guest' practice which recognises newcomers as guests who are offered rights to use the land but only on a temporary basis, while the original habitants retain ultimate authority over land use and ownership (Hussein, 1998). However, as present conflicts in the area demonstrate, pastoral beliefs were ill founded and ultimately led to high mortality rates among their livestock during critical drought periods.

The government, facing increasing dissidence from the Maasai pastoralists displaced from the highlands, initiated the Group Ranch Programme in the plains. The ranches were set up both to prevent or at least make it difficult for outsiders to purchase land, and to encourage a more organised form of pastoralism. However, as described above, this policy also worked against pastoralists which not only lowered their socioeconomic status but also led to the degradation of ecological resources.

Many families within the group ranch system complained about the lack of transparency in the management of the ranches which were run by committees. Moreover, allegations of corruption and illegal sale of land by certain members of the group increased. The lack of recognition of secondary rights to the land (ibid) and a breakdown of the 'moral economy' which provided a safety net in times of hardship (Hendrickson et.al, 1998) further deprived many members of the Maasai community. Increasingly, individual Maasai families are demanding to replace the ranch system with individual titles.

Following independence, a series of land reform acts, based on the English tenure system, did initially enhance the wealth status of the Maasai, but over time gave rise to a new class of landless people comprised mainly of the Maasai themselves. The majority of the Maasai who had for generations adhered to a system of communal or tribal land were suddenly faced with an alien system, of which they had very little knowledge. Although they were allocated resources or assets in the form of individual land ownership, the Maasai did not have adequate knowledge of the new market system or the true value of the asset to which they had enjoyed access, albeit under communal rules, for generations (Coldham, 1978; Hesse, 1996; Ogolla, 1996). This led them either to sell or lease out their land at very low rates to the commercial and immigrant farmers. Mukui (1993) shows that the cost of land was only 5% of total profits generated by the commercial farms. Having sold or leased their land, the Maasai lost access to prime grazing lands and were forced to move their livestock herds to the marginal areas.

Both small and commercial farmers erected fences which blocked the traditional migratory paths that the Maasai pastoralists used for their livestock. With the loss of the critical buffer zone, the pastoralists started to experience high mortality rates in their livestock especially during the drought years in the early 1990s. Income levels fell, and over the decade a large majority of the pastoralist community were pushed below the poverty line (Lenaola et.al, 1997). Similar conclusions can be reached from the data presented in the Economic Survey 1998 (CBS, 1998). Data from household income and using the various sources of income together with household size, a figure of approximately 930Ksh is computed for the pastoralists (the poverty line used in the report is 974Ksh)<sup>4</sup>.

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<sup>4</sup> We took figures from table 3.16, 3.14 and 3.4 to compute the income per capita for the pastoralists.

In a new economic situation the Maasai pastoralists continued to pursue economic activities which they had been practicing for generations (Coldham, 1978; Okoth-Ogendo, 1986). But these were suited to a communal rather than a private land tenure system. Conflicts soon arose between the pastoralists and the mixed farmers (Okoth-Ogendo, 1996). The Maasai pastoralists, who over the years gradually learned to appreciate the value of land ownership, are now beginning to demand the return of their ancestral land. With the support of some of the Maasai political leaders, there have been moves to reclaim the land which is considered to have been taken away under dubious circumstances.

The ecological changes caused by the pastoralists have been primarily linked with overgrazing (Hunt, 1984). Suddenly faced with a cash windfall from the sale of their newly acquired land, they purchased the most valuable asset - cattle. However, the smaller area per livestock unit inevitably resulted in land degradation in the plains (RPD, 1997). The Maasai pastoralists increased livestock numbers to reduce their vulnerability to livestock mortality during critical periods, which in turn will exacerbate livestock mortality rates through increased grazing pressure on marginal lands. This self-defeating behaviour sets into motion the downward spiral into poverty and destitution. At the same time, decreasing forage and water resources will eventually lead to competition between livestock and local wildlife for the dwindling resources.

The response to the plight of the Maasai pastoral community is complex. First, the re-appropriation of their lands or the termination of lease contracts would pose numerous legal problems. Second, preventing the pastoralists from grazing their livestock in nature reserves could potentially lead to violent clashes between them and government forces.

Let us start by considering the re-appropriation of land. Legally, the sale and lease contracts were within the law, but ethically the actions by the commercial and small migrant farmers are questionable. They knowingly took advantage of the lack of knowledge on the part of the pastoral community about the true value of land ownership as well as their belief in continued authority and access. However, the question of returning land is a politically highly explosive issue (Coldham, 1982b). Moreover, this option would only displace another group of people and the same conditions would prevail but with another set of principals as losers.

A possible option would be to leave the small farms as they are and focus on the large farms. A majority of these are under lease contracts. Policymakers could review the existing lease agreements and modify them to reflect the present market conditions with clauses which demand conservation measures be adopted when necessary. This may mitigate two problems. First, a fairer share of the rents from the land would go to the Maasai; secondly it may encourage a more sustainable land management strategy compared to 'mine and shift'. However, the policies must ensure that commercial farmers are not marginalised to the point where they find it unprofitable to continue activities in the District.

A synopsis of the problem is provided in the next section.

# Synopsis of the PASIR Analysis

## Key for diagrams

- solid boxes and lines describe cause-effect relationships within the system of each group of principals.
- grey boxes and lines describe the agent interdependency cause-effect relationships.
- italicised words illustrate effects caused by other agents' activities.
- words in bold depict feedback effects within a group's system.

## Large farmers

- Farmers have benefited from guaranteed prices for their cash crops.
- Farmers have caused reductions in the water supply to the plains as they clear the forest in the highlands for their plantations.
- Farmers have benefited from low land sale prices and/or lease rates as a result of lack of information and knowledge of Maasai pastoralists land owners.
- Farmers have practiced a 'mine and shift' strategy, degrading the land as well as causing off-site flooding and water shortages.
- Farmers have pushed the Maasai pastoralists deeper into the plains as they acquire more land for wheat farming.
- Farmers have forced pastoralists to compete with wildlife for forage due to the encroachment of the wheat farms in the plains; this has displaced the wildlife which in turn has negatively affected tour operators in the area.;
- Ecological impacts caused by commercial farmers have not directly affected their socioeconomic states.

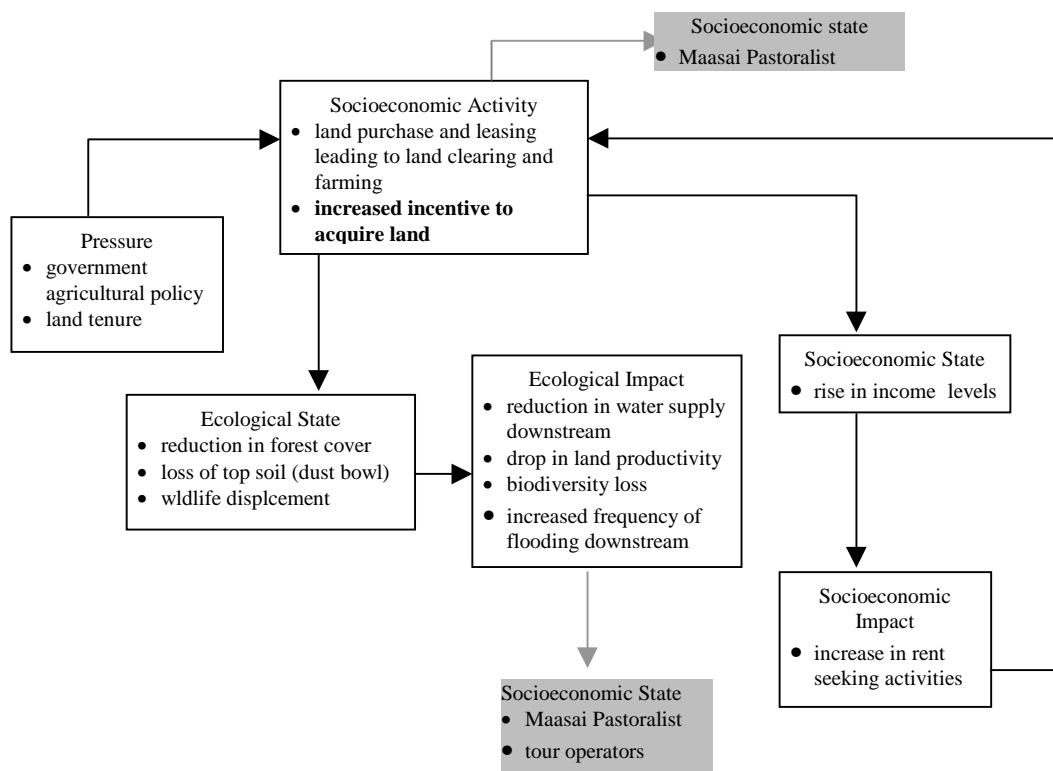


Figure 2. PASIR diagram for commercial farmers

### Small immigrant mixed farmers

- Farmers have benefited from the limited information and knowledge of the Maasai pastoralists on the value of land and have had access to cheap land.
- Farmers have caused ecological impacts which have affected the socioeconomic states of the pastoralists who live in the plains.
- Their land acquisition and/or land use activities have prevented the pastoralists from accessing the highlands during the critical dry season which has had dire impacts on the socioeconomic states of the Maasai.
- Socioeconomic activity of the Maasai pastoralists in the form of violent conflicts has created an environment of fear and apprehension on the part of the mixed farmers.
- Violent conflicts have had a disruptive effect on the economic activities of the mixed farmers, affecting their livelihoods and forcing many into poverty.
- Violent threats and forced evictions has caused landlessness among many mixed farmers who eventually fall below the poverty line as savings are spent;

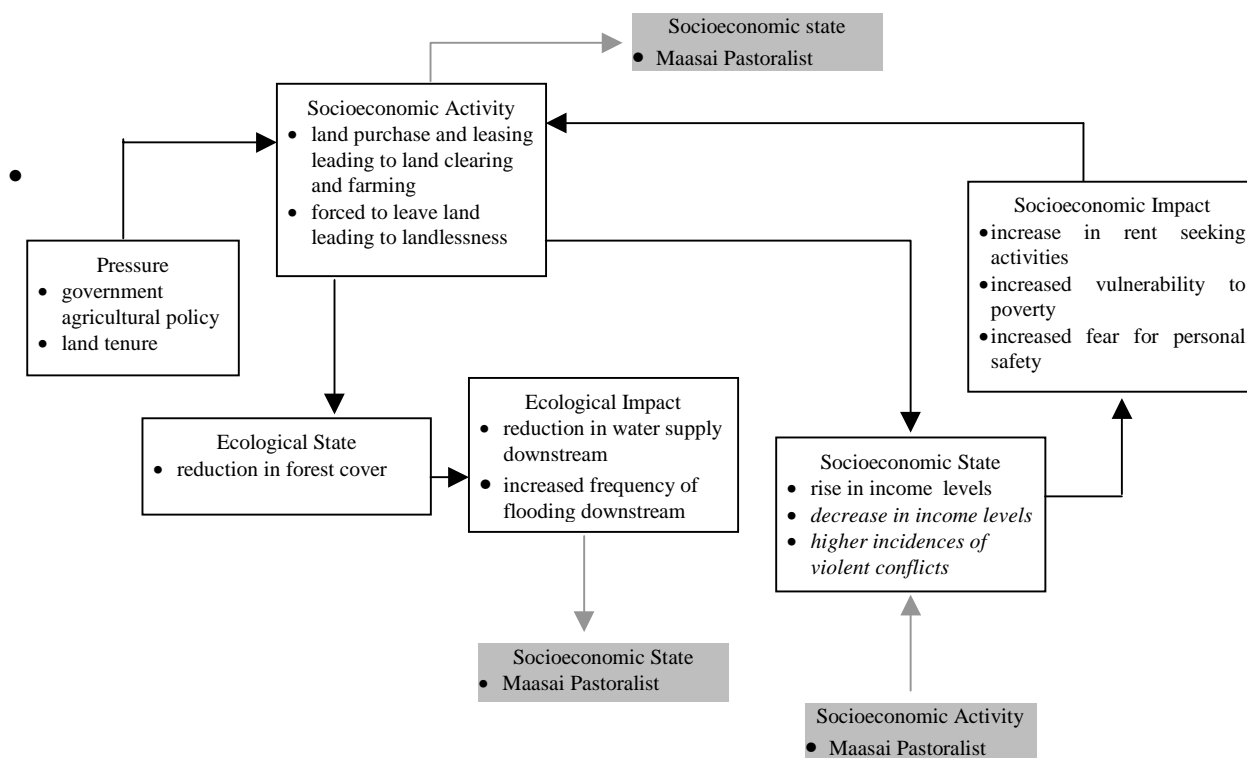


Figure 3. A PASIR diagram for mixed farmers

## Pastoralists

- Pastoralists initially benefited from the land reforms from revenues obtained from the sale and lease contracts on newly acquired land, which was used to purchase more livestock.
- Pastoralists began suffering high mortality rates among their livestock as forage became scarce in the plains caused by overgrazing of their own stock.
- They lost access to grazing lands by being pushed out by tour operators as well as commercial farmers;
- Pastoralists suffered a drop in value on land leased out to commercial farmers as they were returned degraded;
- Pastoralists lost mobility for their herds and thus grazing buffers in the highlands during critical periods causing again mortality among livestock;
- They also lost access to water while suffering a dwindling source of water.
- They began to encroach on nature reserves for grazing land thus causing wildlife populations to decline.
- A continued deterioration of the livestock led to a sustained drop in income levels which inevitable forced many into poverty.
- Anger and frustration at the loss of livelihood forced many to resort to violent conflict.
- Violent activities among the Maasai are currently targetted at the mixed farmers but could spill over to affect other groups.

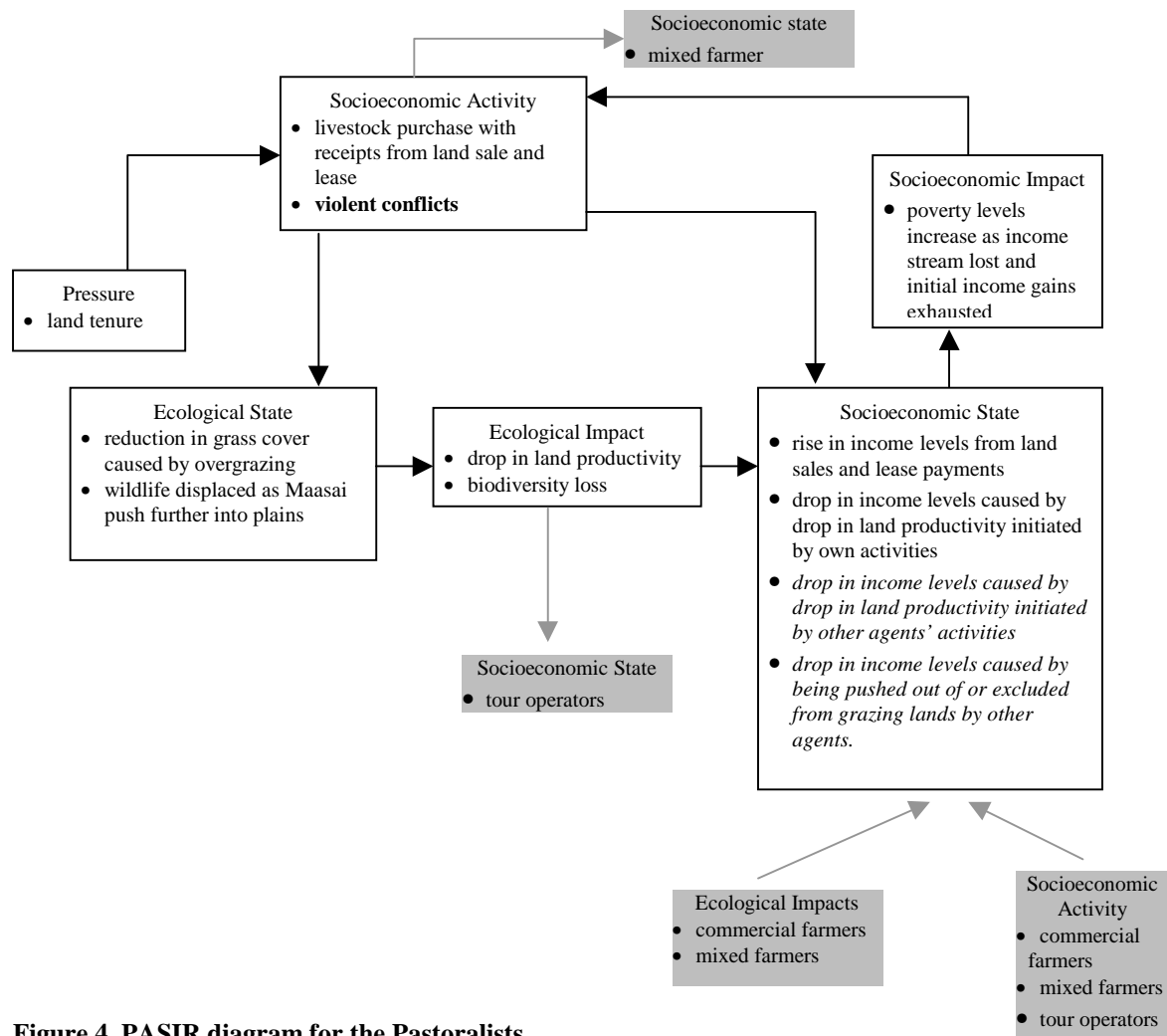


Figure 4. PASIR diagram for the Pastoralists

### Tour operators

- Operators have benefited from the pressure by environmental groups to protect large tracts of land for nature reserves.
- However, they have contributed to degradation of the reserve eco-systems through unrestricted tourist numbers.
- Operators have witnessed a drop in income caused by activities of pastoralists and the commercial farmers.
- Operators are excluding the pastoralists from grazing lands as rent seeking activities set more land aside for wildlife reserves.

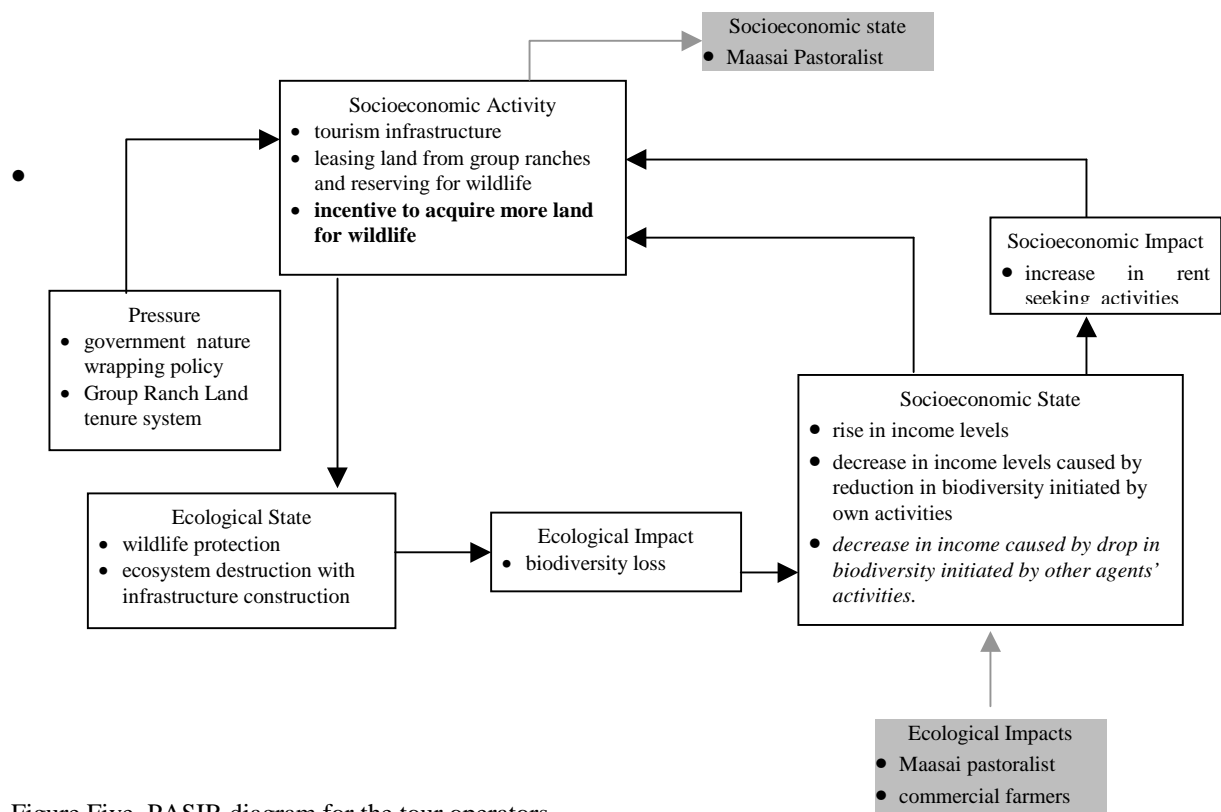


Figure Five. PASIR diagram for the tour operators

## Principals

We categorise the players into four major groups.

- nomadic Maasai pastoralists
- immigrant subsistence or mixed farmers comprised of Kalienjins and Kikuyus
- large-scale commercial farmers, mainly Europeans, Asians, and more recently educated and privileged Maasai
- wildlife tourism industry.

## Pressure points

We identified three pressure points from the PASIR analysis

- government pricing policies
- land tenure policies
- population growth.

## Socioeconomic states and impacts

- income as a state
- incidence of poverty as an indicator of impact
- incidence of violent conflicts as an indicator of impact



## **Ecological states and impacts**

The two main environmental states, about which we are concerned in the Narok District, are:

- forest cover
- land quality.

The ecological impacts associated with the reduction of forest cover are:

- increased incidence of flooding during the rainy season
- a diminishing supply of water linked with the destruction of catchment areas

## **Responses**

Responses are discussed in the following section.

## Conclusion

The PASIR framework analysis we developed for this study has highlighted some critical relationships between and among principals, which have been the crucial driving forces for the nexus governing institutions, poverty, inequality and environmental degradation in the Narok District, Kenya. We trace the impetus for the downward spiral to the land reforms after independence. The principal driving force for these reforms was the government's prime directive to maximise the use of land through agricultural activities. Therefore, following Western type land systems, communal land was privatised and individual land titles were distributed to the Maasai pastoralists.

However, this required a radical change to the pastoral way of life, particularly from nomadic to sedentary agricultural activities. Indeed, the land tenure policies implemented by the government demanded two major changes from the Maasai: a change in economic activity from pastoralists to farmers and a change in their lifestyle from nomadic to sedentary. But, as Coldham (1978) argues, behaviour cannot be legislated for, especially in the absence of incentives, encouragement and government and institutional support. Yet, without the support of government for livestock management, as demonstrated by the dismantling of the Kenya Meat Commission, pastoralists lacked the where-with-all to follow this route.

So, why did the land reforms fail to bring the benefits to the Maasai? In addition to the reluctance of the pastoralists to accept the two major changes demanded by the land reforms, another factor, which recurs implicitly in the PASIR analysis, is the asymmetry of information which existed among the different principals. The commercial and mixed farmers as well as a small group of elite Maasai were more keenly aware of the importance of individual land ownership within the market system as well as the value of the land itself. Moreover, the agricultural activities of the commercial and mixed farmers, in contrast to the pastoral activities of the Maasai, were better suited to the new land tenure system. The spatial and inter-temporal dynamics of Maasai pastoralism on the other hand thrived and depended very much on the communal land system.

We now turn our attention to some possible responses to reduce or eradicate the problems facing the various principals in the District. The reasons for the failure of the land reforms are clearly evident and demonstrated by the PASIR analysis in the previous paragraphs.

As explained earlier, responses can be triggered at four levels – ecological states, ecological impacts, socioeconomic states and socioeconomic impacts. However, it was argued and demonstrated that responses to the impacts are more effective in addressing the root of the problem. The PASIR analysis highlights a number of triggering points for both these categories i.e. ecological and/or socioeconomic. The loss in biodiversity, rapid decline in land productivity, and the increased frequency of flooding as well as decline in water supply in the plains are the ecological impacts that need attention by policymakers. The socioeconomic states that need attention are the increasing poverty levels as well as violent conflicts between the Maasai pastoralists and the mixed farmers.

Let us address the responses to the socioeconomic impacts. The conflicts between the principals are caused by the current increasing animosity of the Maasai pastoralists towards

the mixed farmers, and probably the commercial farmers in the future. The anger is basically fuelled by frustration on the part of the pastoralists at exclusion from their traditional lands, particularly for livestock and the accompanying lower income levels, and a widening equity gap between them and the other principals in the district.

A possible policy solution to recurring violence in the current land privatisation initiative is to build in a number of protective clauses which would prevent exploitation of the Maasai community. One option would be to impose a time option on the sale of land when privatised. The actual time limit can be determined by an information and knowledge clause whereby Maasai pastoralists are taught the value of their land and the potential economic returns, accruable from a multitude of uses.

One possible mechanism is an education and information network whereby information on land values, land use, land degradation indicators and other related issues can be shared among the members. However, a network for the pastoralists is not in itself sufficient. A network comprising all principals will go a long way towards information gathering and sharing as well as conflict resolution. The objective is to make land use and exchange a transparent process whereby market forces dictate prices and uses.

Another important issue to disseminate and resolve is the inter-dependency of principals and their actions resulting from any policy a policy initiative. Therefore, before policies are implemented it is necessary to identify the second order effects in the form of feedback relationships between the activities of various groups of principals in the economy. Moreover, the issue of inter-dependency also highlights the various options available for the principals and the repercussions of alternatives. In the case of the Maasai pastoralists, the option of managing the wildlife reserves has only been explored recently. However, information about gate fees as well as other tourist-related fees is still limited. Similarly information on the benefits and costs of the wildlife industry will assist landowners to evaluate alternative land use choices.

One important question to ask is whether, in this particular study, it is necessary to consider responses to ecological impacts separately? The answer is a qualified no. The ecological impacts highlighted above are clearly addressed when the responses to the socioeconomic impacts are analysed. Land productivity is closely related to returns on land use and the owner who should automatically seek to reduce degradation. Lease contracts with environmental clauses are an option in this direction.

The issue of wildlife and biodiversity requires a different approach. If cost-benefit analysis of wildlife preservation reveals a loss compared to other land use options, then economic theory would dictate the conversion of wildlife areas to other uses. However, this analysis poses a moral issue of global responsibility and accountability concerning wildlife or biodiversity conservation. Even so, it would be difficult to rationalise the preservation of wildlife if other uses of the land would help reduce poverty levels in the District. The question that needs to be put to the global community is whether they are willing to pay a price to conserve this resource, a cost which is currently being borne by the Maasai community in the District.

The study has highlighted a number of important factors underlying the institutions, land use, poverty and environmental degradation nexus in the Narok District in Kenya. First, unilateral government policies that did not take account of the local situation, particularly the Maasai

way of life, has been the primary contributory factor towards the present state of poverty-environmental degradation and violent conflicts. Second, the asymmetry of information among various principals with respect to land use and values has contributed to the exploitation of one group by another inevitably leading to the current violent clashes. Third, the costs of conserving wildlife have been borne largely by the Maasai pastoral community without due compensation. This paper has suggested some responses which may go some way towards alleviating some of the negative socioeconomic impacts arising from the land tenure, environmental degradation-poverty nexus. The unique character of the response is that it depends on the participation of individuals within a group of principals as well as the participation of the various groups within a network, to focus on information gathering and dissemination and not on governmental initiatives.

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