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## **A literature survey about risk and vulnerability in drylands, with a focus on the Sahel**

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## Chapter 11

# **A LITERATURE SURVEY ABOUT RISK AND VULNERABILITY IN DRYLANDS, WITH A FOCUS ON THE SAHEL**

Kees van der Geest and Ton Dietz

### **11.1 INTRODUCTION**

This book deals with the impact of unreliable rainfall, drought, seasonality of rainfall and climate change on rural people's food and livelihood security. Therefore, it touches on the current scientific debates about global climate change and its local and regional impact; the influence of climatic variability on rural people's livelihoods; the development of Early Warning Systems (EWS) against famine; agricultural intensification; livelihood diversification; migration and remittances; and the functioning of a 'moral economy'.

Most central to the research, however, are the debates about (1) rural people's vulnerability to hazards, like droughts and floods; (2) how rural people cope with such hazards and (3) how rural people adapt their livelihoods to changing conditions. In this chapter, a reconstruction of these debates will result in a categorisation of three different concepts of responses: insurance strategies, coping strategies and adaptive strategies (or adaptation). These concepts will be combined in a conceptual framework for studying 'farm household vulnerability and responses to normal opportunities and constraints, unusual events and changing conditions'.

We have avoided the philosophical debate about the role of human beings on Earth and their responsibilities toward other beings and 'nature' in general. We have investigated rural people's struggle to survive in a harsh environment without taking into account the well-being and survival of other creatures inhabiting the Earth. Virtually all research in this field has a clear anthropocentric (as opposed to ecocentric or biocentric) perspective. In this field of research, nature is no longer seen as valuable in its own right (Sachs 1999: 58). Nature is rather seen as a set of resources that human beings seek to manage and utilise for their own survival and well-being. Escobar (1995) refers to this transformation as "the death of nature and the rise of environment."

In this chapter a start will be made with some theory on climate and weather. From there, we will move on to the debate about people's vulnerability to hazards in general and climate related hazards particularly. This will be followed by an outline of theory on rural people's strategies to offset risk and to pursue food and livelihood security in good times and in bad times. We will conclude this chapter with the aforementioned conceptual framework. The scientific debates about some contextually important issues, such as land degradation, agricultural intensification, livelihood diversification,

migration and remittances and moral economy will not be dealt with in this chapter. The theory in this chapter is mostly focused on Sub-Saharan West Africa and the Sahel in particular.

## 11.2 Rainfall Variability: Unreliable Rainfall and Seasonality

It is not the low *average* level of precipitation that makes an area drought-prone. It is rather the inter-annual *variability* of rainfall that causes dry years (Kemp 1994:42). This becomes clear when we take into account the difference between aridity and drought. Aridity results from a low average rainfall and is a permanent feature of a region's climate (*ibid*: 41). Drought on the contrary is a temporary deficiency of rainfall significantly below the normal or expected amount in a year, season, or month.<sup>1</sup> The higher the rainfall variability, the higher the chance of receiving significantly below average rainfall and thus the higher the risk of a meteorological drought that can evolve into an agricultural drought. When we talk of rainfall variability, we have to be more precise. Generally, three types of rainfall variability are distinguished: spatial variability, inter-annual variability and intra-annual variability or seasonal concentration (Schaik & Reitsma 1992: 22-23).

*Spatial variability* concerns the differences in rainfall received between places, either structurally or proximately.<sup>2</sup> Spatial variability is high when great differences occur between places that are relative near to each other. When two nearby villages are separated by a mountain range, one can expect structural differences in precipitation and thus high spatial variability. The village on the weather side will be wetter than the village on the lee side. In the absence of mountains, the amounts of rainfall can still vary greatly over short distances. This can result in different annual drought risks within a small area and this has consequences for the use of agro-climatological information to predict stress in agricultural production and for designing effective Early Warning Systems (EWS) against famine. In chapter four, this will be shown for the Upper West Region of Ghana. High spatial variability has a positive side in terms of coping with food stress. If crops fail in one village due to drought, but neighbouring villages harvest well, part of the food gap can be filled by inter-village transfers (see Toulmin 1986: 65). Moreover, food prices are less likely to increase as sharply as in the case of a region-wide crop failure. This makes it easier for affected households to purchase food. There is a negative correlation between spatial variability and mean annual rainfall. "If mean annual rainfall is low, spatial variability tends to be high" (Foeken 1989: 9).

*Inter-annual variability* is the annual deviation from a long-term average, or the difference in rainfall between years.<sup>3</sup> The analysis of inter-annual variability is usually limited to a comparison of *total annual amounts* of rainfall in different years, while the year-to-year variation in the rainfall distribution<sup>4</sup> is neglected (see e.g. Schaik and Reitsma 1992: 23). This is strange because it is the year-to-year variation in the distribution of rainfall that exposes rainfed agriculturalists to uncertainty and risk. The analysis of inter-annual variability should therefore not only include the annual amounts of rainfall, but also the distribution of rainfall. Foeken (1989: 9) indeed highlights the importance of analysing the inter-annual variability of *monthly* rainfall.

There exists a negative correlation between average annual rainfall and inter-annual variability<sup>5</sup> of annual rainfall (Ruthenberg 1980: 22 and Foeken 1989: 9). In arid regions inter-annual

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<sup>1</sup> The definition used here is of meteorological droughts. The same time dimension is characteristic for agricultural droughts, however.

<sup>2</sup> Proximately here means 'in a given year'.

<sup>3</sup> In statistical terms, inter-annual variability of annual rainfall is the standard deviation of annual rainfall divided by the average annual rainfall multiplied by 100%.

<sup>4</sup> For example: the onset and offset of the rainy season, the occurrence of dry spells and excess rainfall, the number of rainy days, etc.

<sup>5</sup> The rainfall data in the research area show no exception (see chapter four). The existence of a negative correlation between average annual rainfall and rainfall variability is hardly surprising because variability is calculated as the standard deviation divided by the average. When the average is low, the variability is likely to be high. This is not to say that it is not correct to measure variability in this way. The difference between receiving 500 and 700 mm usually has a bigger impact in terms of drought risk than the difference between 1200 and 1400 mm. In the research area, the standard deviation (in absolute terms: expressed in mm) and average annual rainfall did not negatively correlate (see graph 4.4).

variability amounts to more than 50%, while in semi-arid regions the figure is usually around 30%. In sub-humid regions, it is less than 30% (Schaik & Reitsma 1992: 23). Higher average rainfall does not automatically mean lower inter-annual variability in total rainfall, however.<sup>6</sup> In agricultural drought risk assessment, inter-annual rainfall variability is more important than average rainfall conditions (Kemp 1994:42).

*Intra-annual variability* or seasonal concentration refers to the distribution of rainfall *within* a year. It would be zero if every day - or month or whichever time unit is used in the analysis - would experience exactly the same amount of rainfall (Foeken 1989: 7). In the semi-arid and most of the sub-humid<sup>7</sup> regions of Sub-Saharan West Africa, the rainfall pattern is unimodal, i.e. rainfall is concentrated in one wet season in which the rainfed farming activities take place, leaving the dry season for other activities. This means that farmers can only harvest once a year,<sup>8</sup> making the period to bridge between two harvests rather long and concentrating risk in one instead of two harvests. The months before the harvest are often difficult for farmers because food stocks run low and consumption has to be reduced while hard agricultural work has to be carried out (Dietz & van Haastrecht 1997: 51). The seasonal concentration of rainfall gives rise to a seasonality in the agricultural cycle, in labour demands, food availability, food prices, the prices of consumer goods and labour, health births, deaths (Dietz 1991: 86), celebrations and migration patterns.

In Sub Saharan West Africa, the length of the rainy season decreases when one moves from south to north. The rainy season coincides more or less with the summer in the northern hemisphere's temperate regions. This pattern of rainfall results from the annual north-south shift of the Inter Tropical Convergence Zone (ITCZ). This is the area where a dry, continental and a moist, tropical air mass converge. The northward shift of the ITCZ brings moist and relatively unstable air from the ocean and causes precipitation. Droughts in West Africa have been associated with the failure of the ITCZ to penetrate northward as far as usually (Kemp 1994: 48), but this phenomenon cannot explain all West African droughts (*ibid*: 66). It can certainly not explain the high spatial variability of droughts.

Without seasonal concentration, crop production would in many areas be impossible because an even distribution would mean that the monthly rainfall throughout the year would in no period be sufficient to sustain plant growth (Schaik & Reitsma 1992: 23). Intra-annual variability can pose problems to farmers when it is so high that they get too much rain in a short period while the rest of the year does not experience sufficient rainfall for crops to fully develop. This does actually happen in some years. But again, we have to distinguish inter- and intra-annual variability. The analysis of rainfall data in the Upper West Region of Ghana suggests that the *average* seasonal concentration of rainfall does not pose problems to farmers.<sup>9</sup> The problem lies in the fact that the distribution of rainfall varies from year to year. In other words: it is the inter-annual variation in the distribution of rainfall that causes agricultural stress. While the average seasonal concentration is favourable for rainfed agriculture, there are years in which the rain is too much concentrated in one or two months and/or interrupted by detrimental dry spells.

I have tried to indicate that the real problem for the farmer is the unreliability of rainfall, caused by inter-annual variability of both total amounts and distribution of rainfall. Erratic rainfall makes agricultural planning very difficult. Every year, before the farming season, decisions have to be made concerning crop mix, sowing moments, seed varieties, the location of fields, the application of manure and the seedbed type without knowing when the rains will start, how intensive the rains will be, how long the rains will continue and whether or not the rains will be interrupted by dry spells.<sup>10</sup> This makes farming in areas with high inter-annual variability a risky enterprise (Schaik & Reitsma

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<sup>6</sup> See Schaik & Reitsma (1992: 29) for an empiric example.

<sup>7</sup> For a definition of semi-arid and sub-humid regions, see section 1.4.

<sup>8</sup> In northern Ghana, cowpeas form an exception. Cowpeas can be harvested twice in the same rainy season because it takes only two months for this crop to mature.

<sup>9</sup> See chapter four, graph 4.1.

<sup>10</sup> Not all decisions are made *before* the first rains. If necessary, farmers adjust their cropping strategies in the course of the rainy season.

1992: 25). Some farmers in the research area even compared farming with gambling or lottery staking.<sup>11</sup>

### 11.3 Theories on Vulnerability

A natural hazard becomes a disaster when it hits vulnerable people (Blaikie *et al.* 1994: 22; Cannon 1990: 1). While the natural hazard acts as a *trigger event* for a disaster to occur, the underlying causes are to be found in people's vulnerability. These causes are often economic and political. Inequality is the basis of vulnerability (Ribot 1995: 121). It is not easy, however, to uncover the economic and political processes that make some people in a community vulnerable and others secure.

The concept of vulnerability needs further explanation. Vulnerability is often confused with poverty, but although poor people are usually more vulnerable than rich people, the two concepts are not the same. Vulnerability, to distinguish it from poverty, is "not lack or want, but defencelessness, insecurity and exposure to risks, shocks and stress" (Chambers 1989: 1). Vulnerability has an external side of exposure to risk and an internal side that consists of the inability to cope without damaging loss<sup>12</sup> (*ibid*) and the limited potential for recovery (Watts & Bohle 1993: 45). Vulnerability and its opposite security are thus determined by the degree of risk exposure, coping capacity and recovery potential (Bohle *et al.* 1994: 39).

The above definition helps us to distinguish vulnerability from poverty. We talk of vulnerability as relative to a certain hazard (Blaikie *et al.* 1994: 59) and a certain consequence (Ribot *et al.* 1996: 16). People are vulnerable in different degrees to different hazards and consequences. Subsistence farmers are more vulnerable to food insecurity (consequence) caused by drought (hazard) than teachers. The latter group on the contrary, although generally less poor, may be more vulnerable to food insecurity triggered by hyperinflation because they rely more on the market for their food needs.<sup>13</sup> The difference between poverty and vulnerability lies in the external side of vulnerability: the exposure to risk.<sup>14</sup> The internal side is more directly related to poverty. Inability to cope and recover is mainly caused by a lack of resources, alternatives and buffer capacity, associated with poverty. A comparison between household vulnerability to hazards and a human body's vulnerability to diseases can elucidate the abstract concept of vulnerability (see box 1.1).

Vulnerability is now a widely accepted concept in social science. Many scholars have written about it, although in very different ways and more often theoretically than empirically. The early theory on vulnerability has been developed to explain how famines have occurred (Watts and Bohle 1993: 47). The ultimate objective is to prevent future famines by 1) identifying which groups in society are vulnerable to different hazards on different moments; 2) developing Early Warning Systems against famine and 3) designing and implementing policy interventions that reduce vulnerability. According to Davies (1996: 38), however, "rarely are attempts made to monitor *how* people are vulnerable, *how* they are responding and hence what the most appropriate form of intervention might be." That is why conventional Early Warning Systems are rarely ever effective and capable of preventing famine. We should also bear in mind that vulnerability assessments are hypothetical and predictive (Blaikie *et al.* 1994: 59). Assumptions have to be made about which factors increase vulnerability and which factors create security (see chapter six). One can only 'prove' whether the assumptions were valid when the hazard strikes. What follows is a review of some important contributions to the theorisation of vulnerability.

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<sup>11</sup> Similarly, Watts and Bohle (1993: 64) quote a Nigerian colonial officer who talks of the "annual lottery of the harvest". Apart from climatic risk however, he referred to other factors that create uncertainty.

<sup>12</sup> 'Loss' here can refer to becoming physically weak, economically impoverished, socially dependent, humiliated and/or psychologically harmed (Chambers 1995: 20).

<sup>13</sup> Note that hazards do not have to be natural. They can also be socio-economic and political.

<sup>14</sup> This is not to say that exposure to risk does not correlate with poverty. The poor are relatively more exposed than the wealthy because they often live in poor housing (exposing them to earthquakes and extreme weather events); because they often cultivate marginal lands (exposing them to agro-climatologic risk), etc.

## 11.4 The Entitlement Approach of Vulnerability

Sen's entitlement approach to hunger and famine is still very influential in vulnerability research. It argues that hunger and famines are often not caused by a decline in availability of food (i.e. production failure), but by a failure of people to command over food (i.e. exchange failures or entitlement failures). A person's entitlement is defined as the set of different commodity bundles (including food) that he can acquire by using his original bundle of ownership (his endowment)<sup>15</sup> and the various alternative bundles he can generate by using this endowment. A person will go hungry if his entitlement set does not include a commodity bundle with enough food. Famines occur when large groups of people experience this type of entitlement failure (Sen 1987: 7-8). In normal years, entitlement to food and livelihood is gained through a combination of production (both primary and secondary), exchange (of cash, goods, services, sale of labour) and assets (including investments, stores and claims). These three categories can be labelled the endowments. Households with an adequate endowment portfolio are relatively secure. In times of food stress, coping strategies form an additional set of entitlements that are derived from the endowments.<sup>16</sup> The same accounts for adaptive strategies. Adaptation occurs when households have to respond to more permanent changes in their environment or to changes in the household's composition or entitlement base.<sup>17</sup> Together, these five categories are the sources of entitlements to food and livelihood, or the income side of entitlements. To monitor food security, one should look at both sources of and calls on entitlements because both fluctuate over years and seasons. Calls on entitlements, or the expenditure side of entitlements, do not only arise from consumption. Investments and claims from other people or the state are also calls on entitlements (Davies 1996: 35-36). Consumption does not only concern food intake. Even the poorest households have essential non-food cash needs.<sup>18</sup>

Food security is a sub-set within the pursuit of livelihood security. Contrary to what is often thought, poor households do not always pursue short-term food security. When they are faced with stress, they make a trade-off between satisfying immediate food needs and longer-term sustainability and survival. When the granary is getting empty, a household can choose to sell a goat to buy food, but the household can also refrain from depleting certain assets if this endangers their *future* income opportunities. They can choose to go hungry in order to pursue future livelihood security (Swift 1993 and de Waal 1989, in Davies 1993: 60).

People are vulnerable when they face a high risk of entitlement deprivation. In early entitlements research, the most vulnerable people were considered those who were exposed to extreme market fluctuations and disturbances. The entitlement approach emphasises temporary shifts in entitlements and has been criticised to neglect the structural-historical processes that cause the unequal distribution of entitlements to resources. Another shortfall of this approach is the failure to explain what happens *after* a disaster, the recovery process (Watts and Bohle 1993: 47-48). According to Swift (1993: 4), the entitlement approach has neglected food production failures in favour of exchange failures or entitlement failures. By endeavouring to show that famines do not have to be caused by a decline in availability of food, they have shifted emphasis away from production failures, while in fact there have also been many examples in which production failures and a decline in availability of food *did* cause famine. Crop failures still have the potential to cause serious food stress among cultivators (directly, as a production failure) and/or among market-dependent households because of skyrocketing

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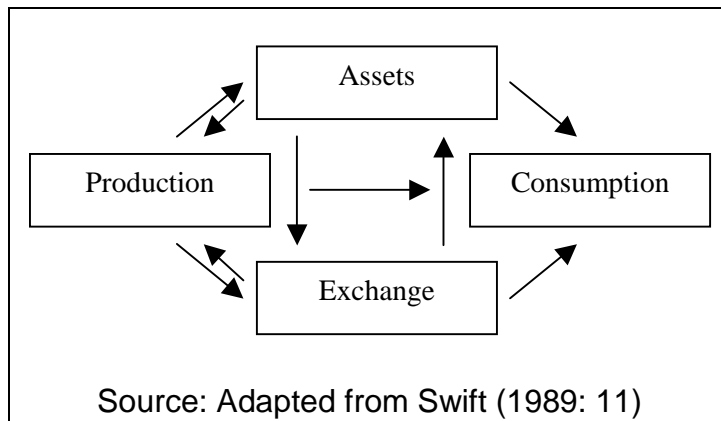
<sup>15</sup> This includes human resources such as the quality and quantity of labour and social claims over resources based on informal rights and networks (Swift 1989, in Bohle *et al.* 1994: 40).

<sup>16</sup> This formulation of endowment and entitlements comes from Davies (1996: 35-36) who can be considered a representative of the *extended* entitlement approach. The original formulation by Sen (1981: 45-46, in Mortimore 1989: 88) was different. There, a distinction was made between a person's endowment (land, labour and other resources he owns) and what he can obtain in exchange for his endowment in a market economy: his exchange entitlement mapping.

<sup>17</sup> Coping strategies and adaptive strategies will be dealt with in more detail in section 1.10 and 1.11.

<sup>18</sup> In the 'two 80 percent rule', ultra-poverty is defined as those people eating less than 80 percent of dietary energy requirements, *despite spending more than 80 percent of their income on food* (Lipton 1986: 4). Most people will spend less on food and more on other needs. Sources of entitlements must also provide in these needs.

Figure 1.1: The role of assets and exchange as a buffer between production and consumption



food prices (indirectly, as an exchange failure).<sup>19</sup> More recent entitlement research, or extended entitlement research (e.g. Davies 1996) has incorporated these criticisms.

Swift (1989) has developed a relatively simple model of four factors that determine immediate, short-term vulnerability (see figure 11.1). He acknowledges that other, underlying factors explain *structural* vulnerability. In this model, production (failures) and consumption are mediated by exchange (failures) and *assets*. ‘Exchange’ concerns a household’s position and participation in labour and commodity markets. Assets are defined in a broad sense to include investments, stores

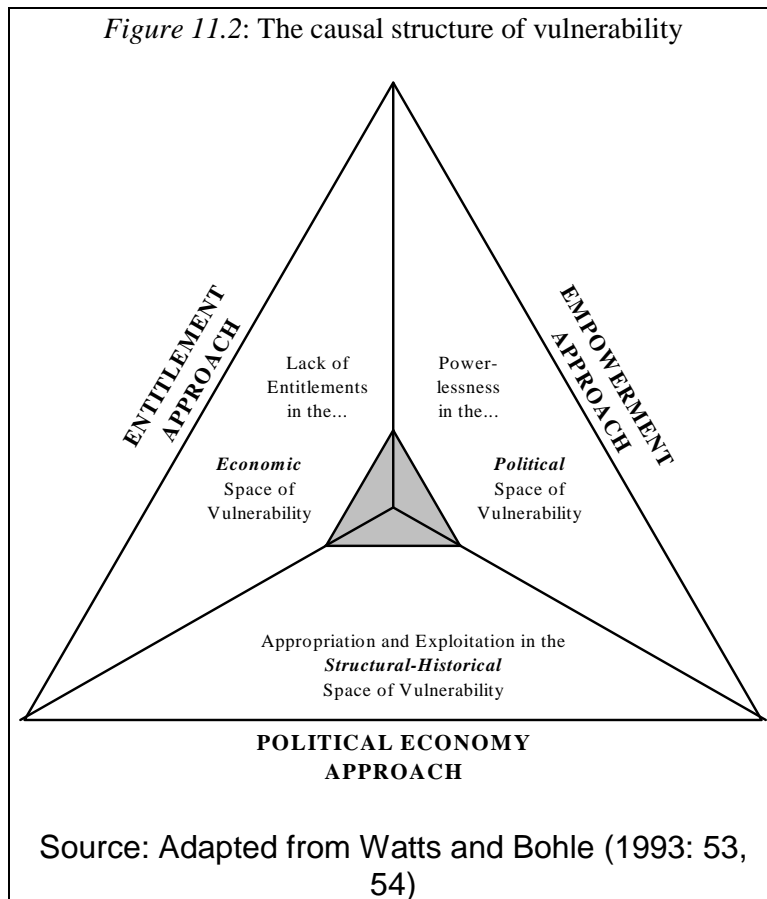
and claims. Assets form a buffer between production, exchange and consumption. Assets are created when a surplus in production and exchange is –willingly or unwillingly – used to invest, to build up stores or to put resources in the community. In times of dearth, these buffers can be converted into productive inputs or into food for consumption, either directly or through selling, buying, bartering and/or inter-household transfers.

## 11.5 “THE CAUSAL STRUCTURE OF VULNERABILITY”

The empirical analysis of vulnerability at the household level is a relatively unexplored field. According to Watts and Bohle (1993: 45) “vulnerability as a concept does not rest on a well developed theory; neither is it associated with widely accepted indicators or methods of measurement.” In their article, they endeavour to narrow the theoretical gap in vulnerability analysis by bringing together different approaches. This effort is an important contribution to the theoretical debate about vulnerability (see Ribot 1995). They do, however, not succeed in providing methods of measurement, especially at the household level.

<sup>19</sup> In the same vein, Leach *et al.* (1999: 232) warn against an excessive polarization of the distinction between *availability of* and *command over* food because in practice, the two phenomena are often interconnected.

Figure 11.2: The causal structure of vulnerability



Source: Adapted from Watts and Bohle (1993: 53, 54)

Watts and Bohle (1993) present what they call “the space of vulnerability: a causal structure of hunger and famine.” They distinguish and review three complementary approaches to vulnerability that together form an ‘analytical triangle’: the entitlement approach, the empowerment approach and the political economy approach (figure 11.2). The entitlement approach has already been outlined above. The *empowerment* approach emphasises that limited command over food results from limited rights and power in three political domains: the domestic domain, referring to intra-household politics; the domain of work, referring to production politics; and the public-civil sphere, referring to state politics (*ibid*: 49-51). The *political economy* approach uses a class perspective to historically explain the structural patterns of entitlement and empowerment in a society. Commercialisation, proletarianisation and marginalisation are processes that increase inequality and vulnerability through appropriation of surplus from direct producers (*ibid*: 51-52). Although there is some overlap between the approaches, each emphasises its own causality. Vulnerability is caused respectively by:

1. Lack of entitlements or command over food in the economic space of vulnerability;
2. Powerlessness in the political space of vulnerability and
3. Appropriation and exploitation in the structural-historical space of vulnerability.

The space of vulnerability is the intersection where these three causal powers determine risk exposure, coping capacity and recovery potential. The three bundles of causality are not mutually exclusive: they exist simultaneously and reinforce each other. Their relative weights can explain the distribution of food insecurity and security between different regions and social groups in the real world. Vulnerable groups in society are (1) the resource poor and those vulnerable to market disturbances; (2) the powerless and (3) the exploited. Vulnerable regions are (1) the marginal regions; (2) the peripheral/dependent regions and (3) the crisis-prone regions (*ibid*: 52-57).

Watts and Bohle (1993: 57-62) also present five historical case studies from South Asia and Sub-Saharan Africa in which they attempt to link the *empirical* differences in the space of vulnerability to their model. They differentiate into class, livelihood system and gender, and they trace changes in type



and degree of vulnerability over different historical periods. They also differentiate livelihood system vulnerability in different years (crisis vs. normal) and seasons (slack vs. peak). Such an analysis can give very interesting insights in the evolution of vulnerability of different social groups over time, but their case studies draw on secondary sources: on researches that were not designed to empirically analyse vulnerability. Consequently, social groups are assigned different types and degrees of vulnerability in different epochs, based on interpretations of historical processes. Therefore, we see no improvement in terms of methods of measurement (we should mention, though, that Watts and Bohle do not claim that they *did* develop a method of vulnerability measurement. That was not their objective: “Each of the following five cases are necessarily sketchy but our intent is to trace, comparatively, the broad contours of vulnerability across space and time” (Watts and Bohle 1993: 57).

Empirical analysis of the political and structural-historical space of vulnerability differs fundamentally from an empirical analysis of people’s entitlements to food and livelihood in the economic space of vulnerability. According to Adger (1999: 253) entitlements to resources are also difficult to measure because of their temporal and seasonal dimensions and intra-household transactions. In his assessment of vulnerability to climate variability and change in Coastal Vietnam, Adger uses income as a proxy for poverty, and poverty as a proxy for entitlement to resources. Adger’s study will be briefly dealt with at the end of this section. According to Davies (1996), vulnerability analysis requires a careful dis-aggregation of poverty and a detailed insight in the way people gain access to food, both in normal years and in stress years. She further emphasises the importance of seasonal variation in access to resources across occupational groups. Contrary to Adger, she therefore does not use proxies (like poverty) for vulnerability. Powerlessness and exploitation in the political and structural-historical space do not cause vulnerability *directly*. They cause some people to have a limited set of entitlements that in turn produces direct food and livelihood vulnerability. The three spaces of vulnerability do not work simultaneously: two spaces relate to underlying causes, while the limited set of entitlements causes immediate vulnerability. The latter type of vulnerability can be measured, but the underlying causes of vulnerability can only be recognised and described. It should be noted that lack of entitlements is not only caused by powerlessness and exploitation. The entitlement approach has its own cluster of causes (explaining *temporary* shifts in vulnerability) to which these two clusters of more *structural* causes can be added.

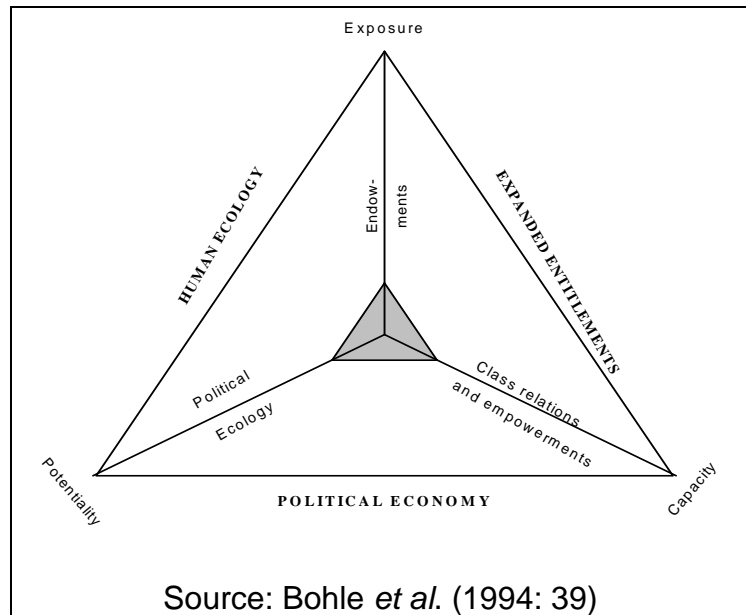
If the objective of vulnerability analysis is to design effective early warning systems against famine and disruption of livelihood systems, it should focus on entitlements to food and livelihood, taking account of the changes over time in sources of and calls on entitlements. It should be borne in mind that a target group’s entitlements to food in a given year (or *proximate* food vulnerability) can only be fully understood if more is known about medium to long-term changes in the baseline of entitlements.

If, on the other hand, *structural* reduction of vulnerability is the objective, then the conjunctural aspects of entitlements, though they have to be understood, can be given less attention and focus should be primarily on the processes that can explain why some groups in society have a more limited entitlements set than others. Following Ribot’s (1995: 120) line of thought: “empowerment is the ability to shape the political economy that in turn shapes entitlements.” Combining the two policy objectives is most desirable and perhaps an imperative. If combined, vulnerability should be analysed by looking at both its immediate and its structural causes.

## **11.6 VULNERABILITY TO UNRELIABLE RAINFALL, SEASONALITY AND CLIMATE CHANGE**

In this section, we will narrow the discussion on vulnerability by focusing on rural people’s vulnerability to unreliable rainfall, seasonality, and climate change. Obviously, rural people face many other sources of risk in addition. Emphasis lies, however, on unreliable rainfall because the purpose of the ICCD research project, is to assess people’s vulnerability and responses to climatic variability in order to inform policy interventions related to climate change. Moreover, unreliable rainfall is one of the principal sources or *the* principle source of risk for rain-fed agriculturalists in the Sahel. As a *hazard*, unreliable rainfall can either be a situation of insufficient rainfall or excess rainfall. Such a hazard will trigger food and livelihood stress when vulnerable people are affected. In many regions, unreliable rainfall is also a ‘normal’ characteristic of the natural environment and so is the seasonality

**Figure 11.3: The causal structure of vulnerability after integration of the 'human ecology' approach**



of rainfall. In that sense, these climatic phenomena should figure, with other natural characteristics, like low soil fertility, among the *structural causes* of vulnerability.

We started the section on vulnerability by stating that natural hazards do not *cause* disaster. Hazards become disasters when they hit vulnerable people. They act as trigger events. In the vulnerability theory as outlined in “the causal structure of vulnerability”, natural factors have not come to the fore. Social, economic, and political factors act together to cause limited entitlements and therefore vulnerability. This notion combats physical determinism in studying disasters (Ribot 1995: 120). It might, however, introduce some kind of social or political-economic determinism (see Blaikie *et al.* 1994: 12) that overlooks the importance of the natural environment for rural people’s livelihoods. Natural factors do not only act as trigger events. In agricultural settings, natural factors largely determine people’s entitlements to food and livelihood in ‘normal’ years; their prospects for creating a surplus and their ability to accumulate assets that reduce vulnerability. In rural areas, own food production is often still the major source of entitlements to food, although this is rapidly changing as a result of livelihood diversification and de-agrarianisation (see Bryceson 1997a). Rural people who live in areas that are endowed with high quality natural resources and a favourable climate have a more reliable set of entitlements than people in risky environments with poor soils and little wild natural resources. To summarise, natural factors can act as trigger events as well as causes of vulnerability. To explain why some communities live in areas with low-quality natural resources (marginal areas), underlying factors in the social, political-economic and cultural domain will have to be considered.

Ribot (1996: 16) argues that environmental (including climatic) variability and change should be incorporated in the social framework of vulnerability. “Vulnerability occurs at a junction of *physical* (my emphasis), social and political-economic processes and events. Hence, complete climate impact analyses must include this multi-causal perspective, placing climate as one causal agent among many”. Reintegrating natural or environmental variables in the causal structure of vulnerability requires a careful distinction between natural factors as *causes* of vulnerability and natural factors that act as *trigger events*. Land degradation as a long-term process and ‘normal’ climatic variability in semi-arid regions are not trigger events. They are natural factors that make people or regions more vulnerable because they put a structural constraint on farmers’ productive entitlements and their capacity to accumulate assets.

In an article about climate change and social vulnerability, Bohle *et al.* (1994) present an adjusted causal structure of vulnerability (see figure 11.3). Following Dreze and Sen’s (1989) incorporation of ‘totality of rights’ in the entitlement approach, the ‘empowerment’ and the ‘entitlement’ approaches are grouped together under ‘expanded entitlements’. The ‘human ecology’ approach of vulnerability is now added to the analytical triangle. Human ecology refers to the relation between *nature* and *society*. It focuses on understanding both the risk environment that vulnerable groups confront, and the quality of their resource endowments, including their *natural* resource endowment. This adjusted model is

more suitable for studying rural people's vulnerability to unreliable rainfall, seasonality and climate change than the one presented above. Bohle *et al.* (1994: 42) position vulnerable livelihood groups in their model according to the three causal powers that determine vulnerability. Refugees, cultivators, pastoralists, urban poor and wage labourers obviously face different types of vulnerability. Subsistence farmers (the livelihood group I studied) are positioned in the human ecology space of vulnerability because they are vulnerable to climatic perturbations and because their livelihoods depend to a large extent on natural resources. A degraded or resource-poor natural environment exacerbates farmers' vulnerability. Their vulnerability to food entitlement decline results from the low productivity of their livelihood system, rather than from a situation of exploitation or powerlessness. Within livelihood groups, certain social groups (women, the elderly, new settlers, etc.) can be extra vulnerable because of limited rights and powerlessness (Bohle *et al.* 1994: 42).

Adger (1999: 251) has tried to assess vulnerability to climatic variability and change in coastal Vietnam. He distinguishes between *individual* and *collective* vulnerability. Individual vulnerability is determined by "access to resources and the diversity of income sources, as well as by social status of individuals or households within a community". Collective vulnerability of a nation, region or community is determined by "institutional and market structures, such as the prevalence of informal and formal social security and insurance, and by infrastructure and income." An additional characteristic of collective vulnerability is high inequality in access to resources. Adger's collective vulnerability is similar to what Cannon (1990: 5) has called the *social-protection* element of vulnerability. It concerns the level of 'preparedness' of the state and civil society to reduce the impact of a hazard. Adger uses poverty indices and the proportion of income dependent on risky (climate related) resources as quantitative indicators of individual vulnerability. GDP per capita and income inequality are used as quantitative indicators (proxies) for collective vulnerability. In his study, the quantifiable factor that is related to climate is the degree in which household income activities are directly dependent on the climate. Qualitative data were also gathered.

Adger found that some changes in the macro-economic and institutional environments (e.g. liberalisation, increased income equality and erosion of collective measures to protect against coastal storms) increased vulnerability. The rolling back of the state had had an ambivalent impact on vulnerability. It had reduced individual vulnerability due to higher incomes from commercial crops. It had, however, increased collective vulnerability because it had undermined existing institutional security-nets (Adger 1999: 266-267).

Adger's distinction of individual and collective vulnerability is very valuable because it conceptually separates *internal*, household-related variables and *external*, area- or community-related variables (see also de Bruijn & van Dijk 1998: 1 and Dietz 1992: 39). The natural environment, the economic environment, the socio-cultural environment and the politico-institutional environment together determine the collective vulnerability or security of a certain area or community. In comparative vulnerability research between, say, agro-ecological zones or between central and peripheral regions, it is useful to distinguish between individual and collective vulnerability. There are secure environments and risk-prone environments. People living in politically marginalized areas with infertile soils and virtual absence of alternative income opportunities are *collectively* vulnerable because these characteristics of the local environment affect everybody. Obviously, this does not mean that all the people in that area face equal vulnerability. The extent to which people are affected when a hazard strikes also depends on their individual vulnerability. Some people in a region or community may even benefit from the vulnerabilities of others in times of stress. There is a differential distribution of individual, household and livelihood system vulnerability *within* the area. This distinction between individual and collective vulnerability has its parallel in terms of risk. *Idiosyncratic* risks affect specific individuals or households (at the micro level). Examples are illness, cattle theft or loss of property and shelter in a fire. *Covariate* risks affect a whole village or region (at the meso-level). Examples are droughts, earthquakes and plagues (see Baas *et al.* 2001 and Nijzink 1999).

## 11.7 LINKING VULNERABILITY AND RESPONSES

As we mentioned earlier, we have not found many empirical studies on vulnerability concerning the Sahel. There is an important exception, however: Davies' (1996) research in Sahelian Mali. Davies'

study can be considered a detailed extension of the entitlement approach. It is an important work because it combines a very strong theoretic framework with extensive data gathering. It also pays much attention to the historical processes that are at the root of present-day vulnerability. Davies links responses to food entitlement decline with different types and degrees of vulnerability and she traces changes in livelihoods over the past three decades, following the Sahelian droughts of the 1970s and 1980s.

According to Davies (1996: 22-23), the notion that disasters are not caused by hazards, but by the underlying causes of vulnerability can result in a static approach to vulnerability. It does not consider how the productive capacities of livelihood systems vary from year to year and from season to season. In Davies' terminology: it looks at *structural* vulnerability (more or less permanent) while neglecting *proximate* vulnerability (changing from year to year). Similar distinctions can be found elsewhere: Kates and Millman (1990) write about "underlying processes" and "immediate causes" and Bohle *et al.* (1994) talk of "long-term structural baseline" and "short-term conjunctural condition".

Table 11.1: Nature and level of vulnerability

<i>Vulnerability</i>	
<b>Nature</b>	<b>Level</b>
Structural vulnerability	Differential vulnerability
Proximate vulnerability	Livelihood System vulnerability

1

Source: Davies 1996: 30.

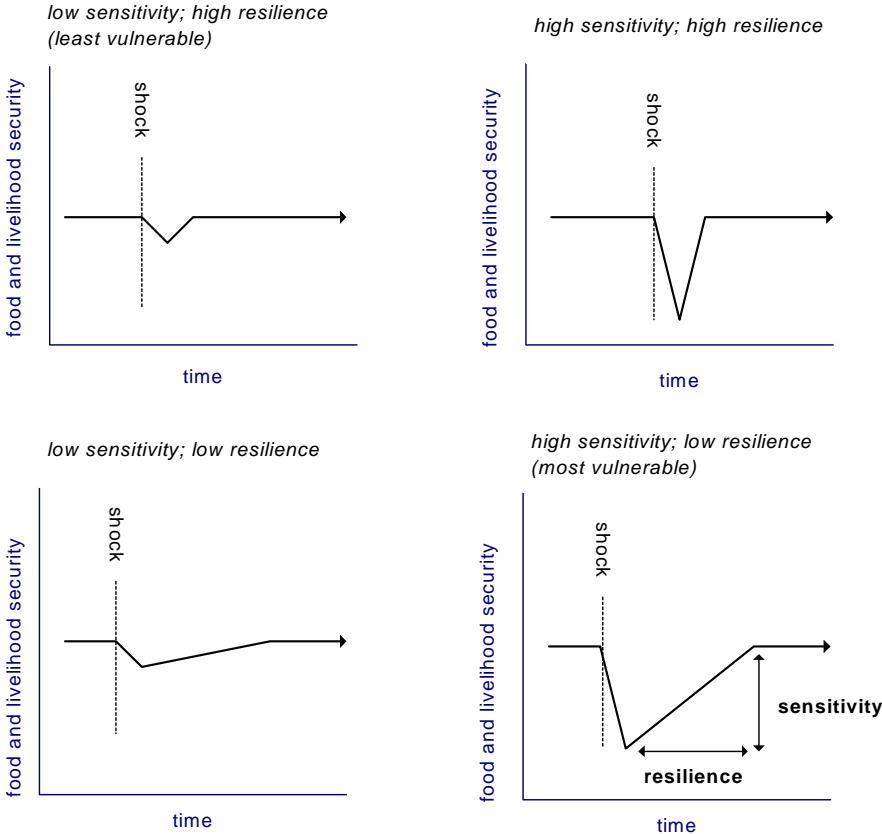
Davies further distinguishes *livelihood system* vulnerability and what Swift (1989) has called *differential* vulnerability. Both can be either proximate or structural. Differential vulnerability concerns differences in vulnerability between households within livelihood systems and between individuals within households. It results from physical characteristics (e.g. children under five, crippled people), type of household (female-headed, high dependency ratios), status in the community, wealth, etc. Livelihood system vulnerability results from the structural and/or proximate productive (in)capacity of livelihood systems. Conventional Early Warning Systems often monitored the structural differential vulnerability (Davies 1996: 23). Davies' study, on the contrary, primarily focuses on livelihood system vulnerability. Secondly, she analyses differential vulnerability to explain differences in vulnerability between individuals and households *within* livelihood systems. Table 1.1 shows the different types of vulnerability. An individual or household can fall into more than one of these categories. The more categories there are, the more intense the vulnerability is. A sick child of poor Sahelian farmers in a drought year, for example, falls in all the combinations of categories. Structural differential vulnerability arises from the fact that the individual is a child and because the household is poor; proximate differential vulnerability because the child is sick; structural livelihood system vulnerability because Sahelian farmers are structurally vulnerable and proximate livelihood system vulnerability because in a drought year, the productive capacity of the livelihood system is even lower than usual.

By looking at people's vulnerability from the point of view of the livelihood systems they are part of and by studying how people in different livelihood systems gain access to food in different seasons of good years and bad years, one can identify why and how different groups of people face shortages on a particular moment. With this understanding, Early Warning Systems against famine and policy interventions to reduce vulnerability become more viable.

To understand how livelihood systems become more vulnerable - or more secure - over time, we have to take account of two dimensions of vulnerability: *sensitivity* and *resilience*. Sensitivity concerns the intensity with which shocks are experienced. Resilience is the capacity to bounce back to a normal state after a crisis (see figure 11.4). Secure livelihoods are characterised by low sensitivity and high resilience. Vulnerable livelihood systems are highly sensitive and not very resilient. In highly sensitive livelihood systems, negative shocks easily cause food insecurity. In livelihood systems that are characterised by low sensitivity, drawing on available buffers can easily absorb the impact of negative shocks.

Households in resilient livelihood systems are able to bounce back to the level of livelihood security of before the shock while in livelihood systems characterised by low resilience, it will take a long time before households recover from a shock. Some household will not fully recover and their livelihoods become more vulnerable. People will try to increase the resilience and reduce the sensitivity of their livelihoods. The livelihood systems that were analysed by Davies had experienced a reverse trend, however. In the past three decades, they became more sensitive, less resilient and thus more vulnerable (Davies 1996: 25-29).

Figure 11.4: Sensitivity and resilience



Source: Adapted from Davies (1996: 27-28)

In Davies’ framework, households in secure livelihood systems are able to meet food needs in most years through their primary production. Secure crop cultivators, for example, will be able to harvest at least a year’s food supply. Income from secondary activities can be used to accumulate assets and to meet non-food consumption needs. In an exceptionally bad year, when primary production does not meet food needs, secure households can cope with this transitory food shortage by shifting emphasis to secondary activities; by engaging in tertiary activities; by drawing on assets and/or by temporary changes in consumption patterns. The following year, *if* conditions are better, secure households will be able to recover without a fundamental shift in their entitlement base.

In structurally vulnerable livelihood systems, on the contrary, households are not able to meet food needs through primary production in most years. Their food insecurity is chronic. They face an annual food-gap that has to be filled by engaging in secondary and tertiary activities. They have a limited capacity to accumulate, even in good years. In an exceptionally bad year, the prospects for coping are limited because their asset base is small and they already depend on secondary and tertiary activities in normal years (Davies 1996: 43). The following example will illustrate this difference between secure and vulnerable households.

In secure livelihood systems, seasonal labour migration, as an *unusual* secondary activity, can be an effective strategy to cope with food stress in an exceptionally bad year. It can supplement own food production, reduce household consumption needs and thus fill the food gap. In vulnerable livelihood systems, on the contrary, young men have to go on seasonal labour migration every year to fill the food gap, so in an exceptionally bad year, seasonal labour migration alone cannot offset stress. Among vulnerable households, seasonal labour migration is no longer a *coping* strategy. It has become permanently integrated in the normal cycle of activities. This is what Davies calls *adaptation*: permanent changes in livelihoods. “Proximate security is the ability to cope, whereas proximate vulnerability is the necessity for constant adaptation” (Davies 1996: 29). In the face of a particularly adverse event, vulnerable households have to tap additional sources of entitlement and/or they have to reduce calls on entitlements. Such additional responses are often erosive, i.e. they endanger the future livelihood security. In such situations, vulnerable households do not *cope*. They become more vulnerable in the face of a new cycle of stress (Davies 1996: 55-59).

In this section, we have used some insights of Davies’ study in an attempt to link the concept of vulnerability with the concepts of coping and adapting. These latter concepts will be further elaborated in section 11.9 But first, a third concept of responses has to be introduced: *insurance* strategies. In the last section of this chapter, we will bring the concepts of vulnerability, insurance, coping and adapting together in a *conceptual framework* for studying ‘farm household vulnerability and responses to normal constraints, unusual events and changing conditions’. The three concepts of responses (insurance, coping and adapting) together form the overall livelihood strategies of households.

## 11.8 INSURANCE STRATEGIES AND COPING STRATEGIES

Besides coping and adapting, a third concept of responses concerns what people do to *avoid* food and livelihood stress in the - nearby or distant - *future*, so before an adverse event hits them. This concept can be labelled ‘insurance strategies’. In Davies’ study, insurance strategies receive less attention than coping strategies and adaptation. Davies quotes Corbett’s (1988: 1107) “sequential uptake of coping strategies” in which the first stage of coping is called insurance mechanisms. While for Corbett insurance *mechanisms* are an early stage in household coping strategies, Davies separates insurance *strategies* and coping strategies. She defines insurance strategies as “those activities undertaken to reduce the likelihood of failure of primary production” (Davies 1996: 47-48). In the case of crop cultivators, this would concern those activities undertaken to avoid - partial - crop failure. When presenting her empirical findings of insurance, coping and adaptation, Davies (1996: 239-246) seems to have abandoned this narrow definition of insurance strategies. Insurance strategies are now adopted more generally to offset potential risk of entitlement failure in the different entitlement bases (production, assets, exchange). This typically includes farmers’ risk avoidance in cropping strategies, but it can also include agricultural intensification and extensification (“Agricultural intensification is increased average inputs of labour or capital on a smallholding (..) for the purpose of increasing the value of output per hectare.” (Tiffen 1994: 29). Agricultural extensification is expansion of the acreage under cultivation, which is measured by increased farm size per capita). When farmers are confronted with declining soil fertility and deteriorating climatic conditions, and the likelihood of not harvesting enough to meet consumption needs increases, they have to take countermeasures. The difference between insurance strategies on the one hand and insurance mechanisms on the other, is that insurance strategies are adopted *before* an adverse event occurs and insurance mechanisms ‘start working’ when people are confronted with the impact of such an event. The former are preventive and the latter are curative.

*Coping* can be defined as “a short-term response to an immediate and unhabitual decline in access to food” (Davies 1993: 60). “Coping strategies are employed once the principal source of production has failed to meet expected levels, when insurance strategies have failed or are failing and producers have to literally cope until the next harvest” (*ibid*: 65). Similar distinctions between insurance and coping are made by Ellis (1998: 13) who speaks of ‘ex-ante risk management’ and ‘ex-post coping with crisis’ and by Dietz and Van Haastrecht (1997: 53-54) who distinguish ‘preventive’ coping strategies and ‘curative’ coping strategies.

What Corbett (1988: 1107) considers insurance *mechanisms* are coping strategies that do not affect future sources of food and livelihood. Typical examples are the disposal of non-productive assets, the

collection of wild foods, reliance on inter-household transfers and seasonal labour migration. In fact, even these actions affect future income sources. If you sell a bicycle or your goats, you cannot sell them again. What is meant here is, that these actions do not seriously affect the productive capacity of the household. According to Corbett, insurance mechanisms are often employed to cope with *predictive* and non-severe risks. The difference between Davies and Corbett becomes clear here. For Davies, coping strategies are responses to *unhabitual* events, while in Corbett's terminology, people also cope with *predictive* and non-severe risks. The period over which these insurance mechanisms (as coping strategies) will be adequate depends on the extent to which the household has anticipated crisis during good years.

It is this *anticipation* or preparation of insurance mechanisms or coping strategies that we have added to Davies' (1996: 47-48) definition of insurance strategies ("those activities undertaken to reduce the likelihood of failure of primary production"). Strategies' in general *could* be defined as "systematic or purposeful behaviour, using all available means to reach a long-term goal" (Dietz 1992: 37). In coping strategies research, however, the term 'strategy' is used to indicate that people have different *options*. They can and indeed have to make choices in the pursuit of food and livelihood security. In other words, they have 'room to manoeuvre'. This seems logical, but in a lot of research, it has not always been acknowledged (*ibid*). Corbett herself (1988: 1100), while reviewing some case studies of famine in South Asia, states, that "farmers living in a drought-prone area will develop *self-insurance strategies* to minimise risks to their food security and livelihoods." But she does not elaborate the distinction between insurance mechanisms and insurance strategies, and sometimes she uses the two interchangeably. Insurance strategies are thus defined by us as those activities undertaken to avoid future livelihood stress and food shortages. It should include those activities undertaken to reduce the likelihood of future entitlement failure altogether, rather than a failure of primary production alone. Investing in food stores, livestock, saleable assets, human resources and social networks are insurance strategies; livelihood diversification is an insurance strategy because it enhances a household's portfolio of options to deal with crises; 'playing the market' (buying and selling when prices are favourable) is an insurance strategy against exchange entitlement failures, etc. In this variety of insurance strategies, a division can be made between insurance strategies that are meant to:

1. Avoid the risk of primary production failure;
2. Diversify the sources of food and livelihood;
3. Create a buffer against future food and livelihood stress and
4. Offset seasonal shortages.

In the case of subsistence farmers, the first category of insurance strategies determines whether or not a household will be self-sufficient in its food production in a given year. The second category determines to what extent households are dependent on primary production. Well-prepared farm households can fall back on secondary and tertiary activities when primary production fails. The third category partly determines the success of coping strategies in times of crisis. When risk has not successfully been avoided and people are faced with food stress, people will start to depend on the buffer they have created in better years. Such a buffer does not only consist of tangible assets. It includes social networks or social support mechanisms. A strong social network is an important asset for people who have to cope with food stress. The construction of buffers in good years is an insurance strategy. The depletion of buffers in bad years is an insurance mechanism or a coping strategy. This system of investment in and exploitation of buffers is relatively straightforward in the case of food stores and livestock. Investment in and utilisation of social networks, on the other hand, is more complicated. Investment in human resources, like education, is an insurance strategy that does not so much follow this pattern of accumulation and depletion. Investment in education is a long-term strategy that often - but not always - continues in bad years. As a long-term insurance strategy, investing in formal education can be very rewarding, for example, when it enables a son or daughter to find a secure, formal sector income.

In general, however, people try to increase their buffer capacity in good years. In crisis years, insurance mechanisms function as an early stage of coping behaviour. Some early coping strategies do not depend on insurance strategies and do not show the same pattern of accumulation and depletion,

however. Examples are seasonal labour migration, collection of wild foods and reduction of consumption. It could, however, be argued that these activities also require a certain anticipation, preparation and/or experience to be successful. Seasonal labour migrants use networks and contacts to find relatively rewarding employment and cheap accommodation. If parents do not transfer knowledge of wild plants, new generations will not be able to effectively adopt wild food collection as a coping strategy. Similarly, it could even be argued that people can only reduce consumption levels during peak agricultural labour when they have steeled their bodies and souls against hardships. This requires a certain preparation or training, too.

It is confusing to equally call these early coping strategies insurance mechanisms, as Corbett (1988) does. It should also be noted that many households do not only insure against food shortages in bad years, but also against expected, normal food shortages in the lean season (the fourth category of insurance strategies). There is an intra-annual cycle of seasonal insurance strategies and seasonal coping strategies, especially in households with a vulnerable livelihood.

When people are confronted with a certain hazard, production and exchange failures can sometimes successfully be avoided through risk-avoidance in primary production and through livelihood diversification. When these measures are not adequate, people will have to cope with the resultant food and livelihood stress. If it is not a very severe crisis, most people will be able to cope by drawing on the buffers that they have created; by finding additional sources of entitlement to food and/or by altering consumption patterns, without jeopardising future livelihood security. These coping strategies can be labelled 'non-erosive'. If the crisis is more severe, for example when an area is hit by drought in several subsequent years, or when several hazards strike simultaneously, the set of non-erosive coping strategies will soon be exhausted and people will have to take more drastic actions to combat the crisis. These actions can seriously affect people's future livelihood security and these 'coping strategies' can be labelled 'erosive' (De Waal 1989, in Davies 1996: 54). The label 'erosive coping strategy' contains a contradiction in terms, however. 'To cope' literally means: to deal successfully with something difficult: to manage. When a certain response to entitlement decline jeopardises a household's future food and livelihood security, this household is not 'coping'.

## 11.9 COPING STRATEGIES AND ADAPTATION

In the 1960s and 1970s, poor people were often approached in social science as passive victims who were economically exploited and politically marginalized. In this view, they themselves could not do much to improve their lot or to harness against disaster. In the 1980s, it was realised that even very poor people have different livelihood *options* (Dietz *et al.* 1992: 37). Research started to focus on how some people managed to overcome extreme difficulties associated with recurrent drought and other stresses, while other people did not. Answers to this difficult question were found both in differences in vulnerability and in coping strategies. Many questions remain unanswered, however. In the case of coping with drought, Webb and Reardon (1992: 230) argue that most studies have tried to identify *general patterns* of coping rather than differentiating between agro-ecological zones, villages and types of household. In the 1990s, scientists have endeavoured to fill this gap in our understanding of how different types of households deal with stress.

It was often assumed that coping strategies show a sequential uptake and that increased knowledge about the sequence of uptake could inform Early Warning Systems against famine. There are several caveats in the monitoring of coping strategies for early warning, however. Sequential uptake suggests that there are discrete stages of responses to food deficits. Each response (or cluster of responses) is adopted and exhausted before the household moves on to the next response. In reality, this is not the case, as Devereux (1993: 54) argues, because different responses do not have the same 'time relevance'. Coping strategies can involve discrete, 'only once' events (e.g. distress migration); a series of discrete events (e.g. animal sales); or continuous processes (e.g. rationing of consumption). So although there may be a certain order in people's responses to stress, it should be realised that different responses occur simultaneously, as parallel processes rather than sequential events. Besides this practical critique on the 'sequential uptake approach', Davies (1993: 61) argues that coping strategies are too often seen as an "inherently good thing". Her concern centres on four points:



- ‘Coping strategies’ is often used as a catch-all term for anything people do over and above primary productive activities.” (..)
- Focusing on coping strategies in situations of food stress can imply that people *do* cope and thus that food insecurity is a transitory phenomenon. (..)
- While coping strategies may be useful in the short-term (..), they may be bad for longer-term development. Implicit in coping strategies is that the entire working life of subsistence producers is taken up in acquiring food, enabling people to stand still, but preventing them from moving ahead. A focus on coping strategies also hides the (increasing) need of rural producers to develop livelihood strategies, which will provide for greater numbers of people in the future.
- Coping strategies are not necessarily economically and environmentally sustainable. (Davies 1993: 61).

Davies argues that people’s coping strategies are not cast in stone: that they change over time. By focusing on coping strategies in the conventional way, structural changes in people’s livelihoods and worsening conditions might be overseen. To preserve the usefulness of the concept, both in monitoring proximate food insecurity and in strengthening people’s capacity to avoid disaster, coping strategies have to be defined more narrowly and distinguished from adaptation. In Davies’ definition, coping strategies concern people’s short-term responses to *unhabitual* food decline. Genuine coping strategies are abandoned once the worse stress is over and households start to recover (Davies 1993: 62). Whether a certain response should be labelled ‘coping’ or ‘adapting’ depends on the intensity, timing, effectiveness and sustainability of the response and most all on the reason why the household adopts this particular response (the motivation). This differs per household, per livelihood system, per region and over time.

Many farm households in dryland West Africa are confronted with food shortages almost every year. This usually occurs in the lean season, prior to the new harvest, when grain stores are running low. As mentioned above, people also have insurance and ‘coping’ strategies to deal with these predictive, seasonal shortages. In Davies’ view, these livelihood systems are structurally vulnerable and the strategies to fill the annual food gap are not coping strategies, but adaptive strategies because they have become permanent features of livelihoods. Adaptation concerns permanent changes in the mix of ways in which food is acquired, irrespective of the year in question (Davies 1993: 60). It is a bit confusing, however, to apply the label ‘adaptive strategy’ or ‘adaptation’ to responses that people have already been adopting for (many) years to fill the food gap. Adaptation implies change. If we compare two static periods (the ‘present’ and the ‘past’), it is clear that permanent changes in livelihoods are adaptations. In an ongoing, dynamic analysis of the ways in which people gain access to food and livelihood, an adaptive strategy in one year becomes part of the overall livelihood strategy in the following years.

Longhurst (1986: 27-33) distinguishes *seasonal* coping strategies and *famine* coping strategies, and Campbell and Trechter (1982) distinguish between coping with expected and coping with *unexpected* food shortages. It is acknowledged that the two are closely linked and that it is sometimes difficult to draw the line between these two categories. For crop cultivators, there is a continuum between a good harvest and a total crop failure. Given the same agro-climatic conditions, some households may face a non-severe seasonal shortage while other households in the same area may face real hunger conditions. Moreover, famine coping strategies are often an intensification of seasonal coping strategies. Similarly, Dietz (1991: 87) argues, that: “a normal hunger season during a year with average rainfall and a severe hunger season as a result of drought are not two distinct categories. In practice it is a difference between few and many households coping with a crisis situation”. He further argues that when a crisis is very severe, it is confusing to speak of ‘coping’ strategies. ‘Survival’ strategies would be a more appropriate term (*ibid*: 88). Indeed, one can question whether we should speak of ‘coping’ when a household sells all its livestock at low prices to buy grains, while at the same time eating tree leaves, betrothing a daughter, going hungry and/or endangering next year’s harvest with ‘hunger trips’ for temporary low-yielding wage work during the farming season. People loose. If not their lives, then at least (part of) their means of livelihoods, making them destitute. If coping means *successfully* dealing with difficulties, it is quite clear that people in these situations do not cope.

In Davies’ study in Mali, vulnerable households are those that are not able to meet a year’s food demand by primary production. Unlike most scholars, Davies does not regard livelihood

diversification as a positive development *per se* because it is often a *forced* adaptation to deteriorated conditions. As Davies (1996) argues: “Diversification in the Sahel has followed a pattern of change that makes people more vulnerable. Activities that in the past were only carried out in periods of stress (as coping strategies) are now pursued every year, limiting the possibilities of coping in the next cycle of stress. They have become part of the normal livelihood strategies.” In the Sahelian zone of Burkina Faso, Reardon *et al.* (1988: 1065) found that “almost all households rely to a certain extent on [food] purchases”, and incomes are highly diversified in order to “insulate food consumption from broad swings in the local cereal sector”, caused by climatic variability. They found that most households were production deficient. Nevertheless, the majority was food secure. They relied for more than 75% on non-cropping income, and because income opportunities were multi-sectoral, they showed low levels of covariant risk. It seems that these households have quite *successfully* adapted to high levels of inter-annual rainfall variability, mostly through diversification.

In a review article about rural livelihood diversification, Ellis (1998: 2-3) summarises some of the conflicting findings in diversification research. Sometimes livelihood diversification is found to be a “deliberate household strategy” and sometimes it is an “involuntary response to crisis”, depending on location and the economic status of households involved. Rural livelihood diversification is defined here as “the process by which rural households construct a diverse portfolio of activities and social support capabilities in their struggle for survival and in order to improve their standards of living” (*ibid*: 4).

To avoid confusion, it is necessary at this point to define adaptation or adaptive strategies. In Mortimore’s (1989: 3) important study about adapting to drought in northern Nigeria, “adaptation is understood as a sequential process in which solutions to problems become in turn a part of the next problem.” Mortimore does not use the concept of coping strategies because in the livelihood systems he studied, uncertainty was the norm rather than an aberration. Responses to drought in his study are short-term adaptations whereas in the theory outlined above, adaptation was a longer-term or even (semi-) permanent phenomenon. A definition of livelihood adaptation, provided by Davies and Hossain (1997: 5) takes into account that adaptation - like livelihood diversification - can be both positive and negative and distinguishes adaptation more explicitly from coping:

... livelihood adaptation [is] the dynamic process of constant changes to livelihoods which either enhance existing security and wealth or try to reduce vulnerability and poverty. Positive adaptation is by choice, can be reversed if fortunes change, and usually leads to increased security and sometimes wealth. It is concerned with risk reduction and is likely to involve an intensification of existing livelihood strategies or a diversification into neighbouring livelihood systems. (..) Negative adaptation is of necessity, tends to be irreversible, and frequently fails to contribute to a lasting reduction in vulnerability. It occurs when the poor are forced to adapt their livelihoods because they can no longer cope with short-term shocks and need to alter fundamentally the ways in which they subsist. (Davies and Hossain 1997: 5).

In Davies’ research area, adaptation occurred when coping strategies became permanently incorporated in the normal cycle of activities (Davies 1996: 35). But, as becomes clear from her definition of adaptation, this is not the only way in which adaptation can occur. People can also structurally improve their livelihood security, for example by changing from hoe-farming to plough-farming, by starting a dry season garden, by buying a sewing machine to become a dry season tailor, by geographic spread of social networks, etc. This type of adaptation can more generally be called ‘livelihood strategies’ (see Dietz *et al.* 1992: 38). Some – but not all – of these strategies are indeed intensifications of earlier coping strategies, but if they help people to accumulate and diversify more, it makes their livelihoods more secure. Even though these activities can no longer be used as genuine coping strategies, necessity to cope will occur less frequently. If these adaptive strategies result in or are accompanied by a drastic decline in own food production, household become less vulnerable to climatic stress, but more vulnerable to market perturbations. Research at household level should be able to identify how the balance between primary productive capacity and livelihood diversity evolves over time.

Many adaptive strategies involve a more efficient time and labour management, especially in areas with a marked seasonality in agricultural activities. Instead of ‘idling’ between one year’s harvest and next year’s land preparation, farm households engage in other income generating activities. This is not

necessarily an improvement in *quality of life* for everybody. An intensification of livelihood strategies will decrease leisure time and rest.

## 11.10 CONCEPTUAL FRAMEWORK OF FARM HOUSEHOLD VULNERABILITY

In this section, we will present a conceptual framework (see figure 11.5) that seeks to combine the theory on vulnerability and responses to stress as outlined in this chapter. The conceptual framework is an iterative model with an annual cycle. The units of analysis are individual farm households. For non-farm households and for farm households in areas with two growing seasons, similar models can be designed with shorter cycles of production and consumption. The model takes into account that part of the farm households in the research area have to deal with *seasonal* food shortages even in normal years: that a good number of farm households are not self-sufficient in their food production. Their entitlements to food through primary production are inadequate. To supplement their subsistence production, these farm households adopt *seasonal* coping strategies.

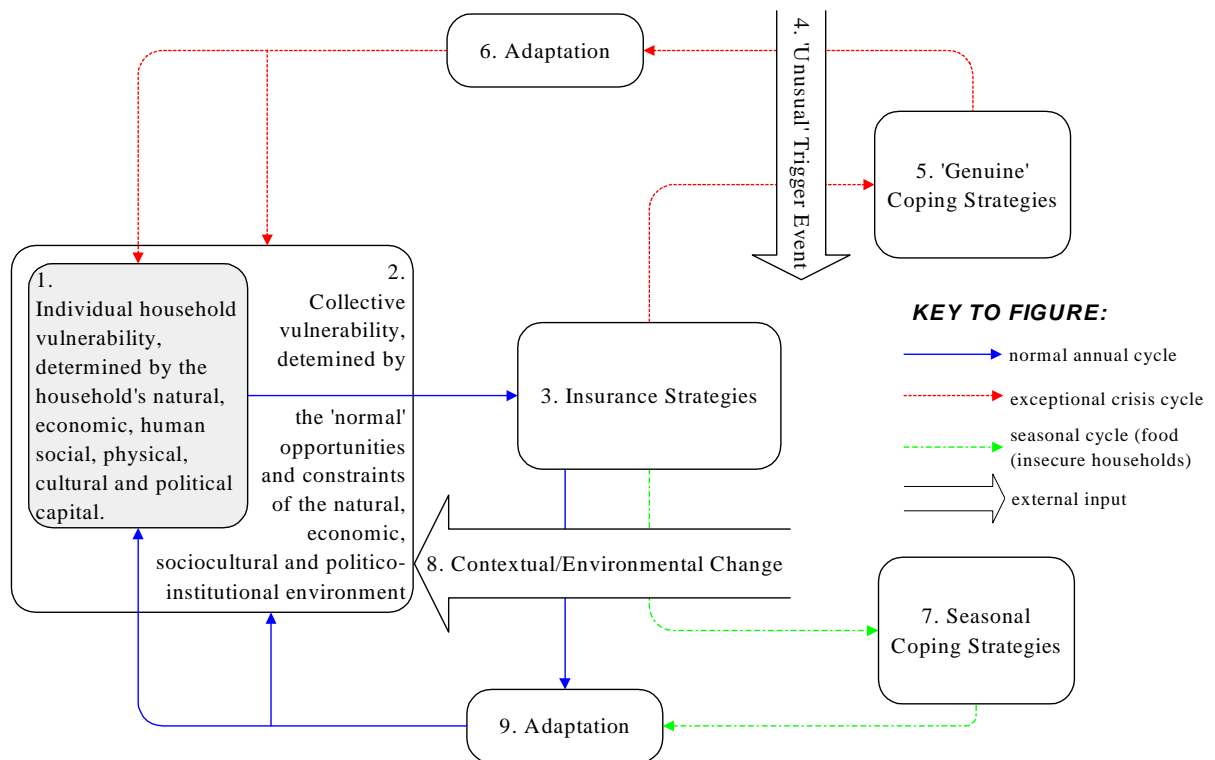
In years of unusual stress (e.g. in drought years), the cycle is broadened to include 'genuine' coping strategies in the narrow definition of Davies. Some trigger events or sources of food and livelihood stress concern idiosyncratic risk while other events concern covariate risk. In a given year, some households may be confronted with an unusual stress whereas other households will only have to deal with normal constraints. The model assumes that it is possible to distinguish between normal opportunities and constraints, unusual events and gradually changing conditions and that it is possible to distinguish between seasonal coping strategies in 'normal' years and genuine coping strategies in 'exceptional' years. Davies' study shows that this is very difficult, but not impossible.

The conceptual framework is dynamic in the sense that the outcome of responses in one year determines the household's point of departure in the next year. In theory, it is possible to follow and quantify a household's livelihood situation throughout its own history and thus 'fill in' the model for a specific household. A more feasible possibility is to use the model to reconstruct a household's or an individual's livelihood history from the past to the present (to reconstruct its 'pathway'). The conceptual framework also takes into account that the adopted strategies of the farmers in the research area have an impact on their environment. For an elaboration of the feedback of human activity to 'the environment', see Leach *et al.* (1999: 219):

... environments are constantly transforming and emerging as the outcome of dynamic and variable ecological processes and disturbance events, in constant interaction with human use. In other words, environmental conditions at any given time can be seen as the product of both ecological and social history. (..). Seen in this way, the environment provides a setting for social action but is also a product of such action. (..). As present practices build on the legacy of past ones, so the causality of environmental change may need to be seen as cumulative, sequential or path-dependent. (Leach *et al.* 1999: 219).

We will briefly explain how the model works. Block 1 contains the characteristics or the 'capitals' of individual households that determine their individual vulnerability on a given moment. Block 2 shows the different types of environment in which these households live. The opportunities and constraints of the environment determine vulnerability at the area or community level. Block 1 and 2 together determine the household's food and livelihood situation in a given year and how the household can insure (block 3) against unusual trigger events (block 4). If such an event occurs, the household characteristics, the opportunities and constraints of the environment and the adopted insurance strategies together determine how a household can cope (block 5). When coping strategies become recurrent and part of a household's normal livelihood, the household is adapting to modified conditions (block 6). But this is not the only way in which adaptation occurs. Adaptation is a constant process. People can also adapt their livelihoods as a response to improved opportunities. Adaptation can be forced or voluntary, but even when it is forced, adaptation itself does not make people more vulnerable. When households adapt their livelihoods to deteriorated conditions, they seek to minimise the impact of this deterioration. Sometimes adaptation is reversible. Sometimes it is not.

Figure 11.5: Conceptual framework: Farm household vulnerability and responses to normal opportunities and constraints, unusual events and changing conditions



In this framework, adaptation concerns both structural changes in livelihoods and short-term shifts in the entitlement base. The former aspect of adaptation is derived from Davies' definition of adaptation and the latter aspect echoes Mortimore's approach of adaptation. In the latter sense, adaptation is not really an active strategy. It rather functions like a *balance* between a household's entitlements to food and livelihood (or resource base) in a given year and their strategies to cope with seasonal (block 7) or unusual (block 5) stresses.

An extremely simplified example can illustrate the mechanism: A farm household with five household members owns six goats and two pigs and it has two bags of millet in store. In the year under investigation, the rains are not very good and the household harvests seven bags of millet, which is not enough to feed the family until the next harvest. They need ten bags of millet to secure their food needs. To cope with the food gap, they eat their millet store; they send a son on seasonal labour migration and they sell one pig and two goats. Five young goats are born. With the revenue of the animal sales, the household head buys four bags of millet. With the off-farm income of the son, they cover the non-food expenses. At the start of the following farming season, the household will have three bags of millet in store, nine goats and one pig, which is more than they had a year before. It is not a fundamental or permanent change in the household's livelihood, however. It merely concerns the balance of a year's production and consumption. If the balance is positive in several subsequent years, the household becomes more secure because they increase their buffer capacity. They may decide to invest the accumulated surplus in productive assets, like bullocks and a plough. This can be considered a fundamental change in their livelihood. If the balance is negative in one isolated year, the resource base decreases and the household will become slightly more vulnerable. No fundamental or permanent change in the household's livelihood occurs, however. If the balance is negative in several subsequent years, or if the balance is extremely negative in one year, the household's security endowment

portfolio will substantially weaken and the household will become more vulnerable. If, in this state of vulnerability, the household is confronted with a particular adverse event, the household may be forced to sell its land and migrate to an urban centre. This would be a fundamental and possibly permanent change in the household's livelihood situation.