Disaster Management in the Land Development Chain

Julian SIMELA and Emmanuel TEMBO, Botswana

Key words: Land Development, Disaster management

SUMMARY

Land development processes acquire unimproved land and transform it into property that can sustain a multitude of activities. In sustainable development, some of the planning objectives of a land development process include the improvement of the quality of life and the safety of the general population. To ensure and uphold the safety of the general public that resides in any area, land development processes should ideally consider issues of risk assessment and disaster management.

This paper explores the current practices of land development in Botswana. It looks at the major stakeholders and their relationship to the land development process. The paper hypothesizes that risk assessment and disaster management are currently not components of the land development process and as such should be incorporated into suitability studies for land development. The paper also highlights conflicting laws and regulations relating to the planning process. Amongst other things it expresses the need for environmental awareness during the land development process and concludes by proposing a land development model that would incorporate disaster management issues as well as suggest how conflicting laws relating to land planning and allocation can be harmonized.

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1. INTRODUCTION

There is general recognition that as land development takes place more and more people begin to live in urban settings (World Bank, 2001). In the land development process, unimproved land is transformed into property that can sustain a multitude of activities. While urbanisation is said to spur development, it however brings about challenges such as congestion, air pollution, poverty and general degradation of the environment. The challenge also includes the fact that land development quite often takes place in areas that are prone to either natural or technical disasters. This is because as development occurs there is an increase in population densities which if not properly managed will involve the occupation of land that might otherwise be classified as unsuitable. Suitability studies are normally not fully carried out to determine the most suitable use of land for settlement. In most developing countries the pressure to settle people seems to override any other consideration related to suitability and therefore little or no consideration is made of the risks associated with the settlement.
The paper addresses the land development process in Botswana vis-à-vis the integration of disaster management in this process. Land development is governed by statutes that might not be fully harmonized and which do not fully integrate disaster management. Land development also is affected by the tenurial characteristics of the land.

2. BACKGROUND

It is given that humankind will increasingly become vulnerable to disasters owing in great part to the nature of humankind's settlement patterns. The prognosis is that urban growth is universal and will continue to grow. The World Bank estimates that 50% of the world's population will be in urban areas by 2020(World Bank, 2001). The UN Secretary General stated this at the turn of 2000: "*We have entered the urban millennium. At their best the cities are engines of growth and incubators of civilization. They are crossroads of ideas, places of great intellectual ferment and innovation….Cities can also be places of exploitation, disease, violent crime, unemployment, and extreme poverty*…" (UN Press release SG/SM/7479, 2000). It is clear that settlement, especially urban settlement, brings about development on the one hand it also brings about serious problems related to development as stated above.

2.1 Disasters

A disaster can be described to be "an occurrence that causes damage, ecological disruption, loss of life and demands upon health and health services on a scale sufficient to warrant an extraordinary response from outside the affected area". (Kötter, 2004). From the Government of Botswana perspective disaster is defined "as an event that seriously disrupts the normal pattern of activities in a given area as a result of interaction between a hazard and a human population, that results in loss of life and property, injury and economic and social hardships,

as well as the possible destruction and damage to government systems, buildings, communications and essential services." (GoB, 1996). Disaster, therefore refers to an "event" or "occurrence" that would cause some of loss of life or property.

2.1.1 Types of disasters

The Government of Botswana's policy document on Disaster management outlines the types of disasters to be those that are actually or potentially prevalent in Botswana. These are listed as: Floods, veld fires, pest infestations, epidemics, animal diseases, severe weather (including hailstorms and lightning strikes), refugee influxes, industrial pollution and chemical spillages. This list is of course not exhaustive and can be augmented at any time.(GoB, 1996). Kötter (2004) identifies at a global scale 3 types of disasters and their vulnerability (see Figure 1).

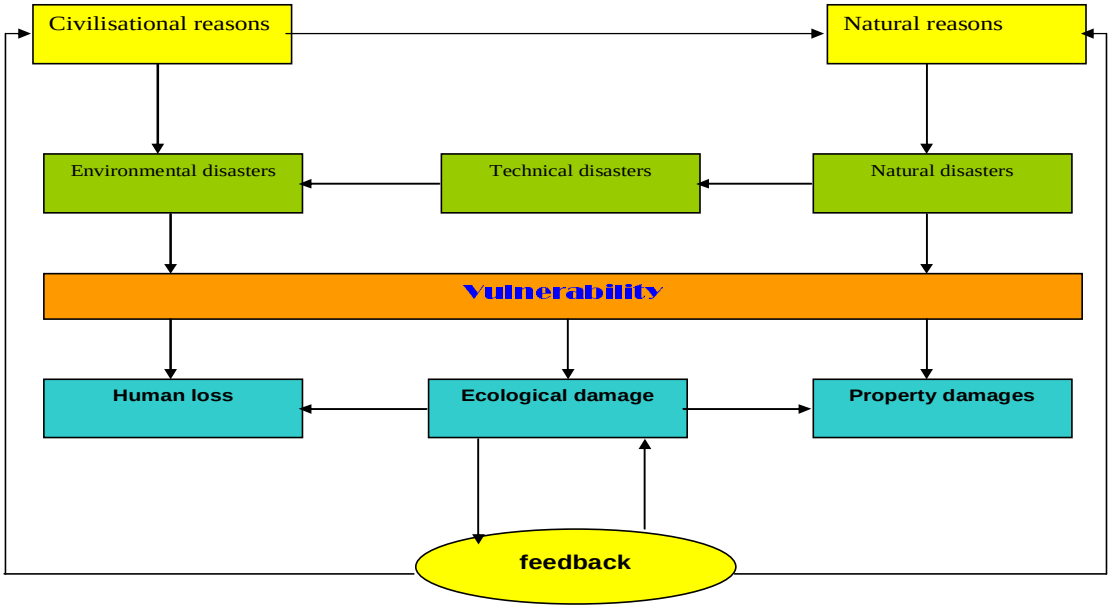

Figure 1: Disaster interrelationships (after Kötter)

Disasters can be environmental, technical or natural as shown in Figure 1. Disasters can occur due to natural causes or due to humankind's development. There is no distinct boundary between the various types of disasters because a natural disaster might lead to technical as well as environmental disasters. The model in Figure 1 therefore shows the linkages between the 3 types of disasters. What is critical is that because of the possibility of disaster humankind is vulnerable to loss of life, environmental degradation and loss of property. Vulnerability has been defined as "The conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards" (UN, 2004). The degree of this vulnerability is dependent on how humankind prepares itself for possible disaster. This means that as much as possible all the issues concerning vulnerability should be feedback into the system. This will inform the mitigating factors .

2.1.2 Disaster and communities

Figure 1 the fact that every society is susceptible to some form of disaster or another. As the UN Secretary General has said "*human communities will always face natural hazards-flood, droughts, storms or earthquakes; but today's disasters are sometimes man-made, and human action- or inaction- exacerbates virtually all them*". He further states that "*human behaviour transforms natural hazards into what should really be called unnatural disasters*". (Ibid, 2000). The natural hazards which are ever present can be mitigated if society is aware of them and systems are put in place to minimize society's vulnerability. Unsustainable development practices or the "human behaviour" as stated by the UN Secretary General can contribute to the ever greater impact of natural hazards.

It is estimated that in the 1960s natural disasters caused some US$52billion; In the 1990s the cost had already reached US$479billion. Another study by the UNDP (2002) shows the rise in economic losses as well as loss of life between 1972 to 2002 due disasters. See Figure 2. Although between 1993 to 2002, the number of dead came down, the number of affected people increased. The major impact is the ever increasing economic losses. Clearly governments need to take a keen interest in the prevention of disasters because non-prevention leads to losses in both of human life and property.

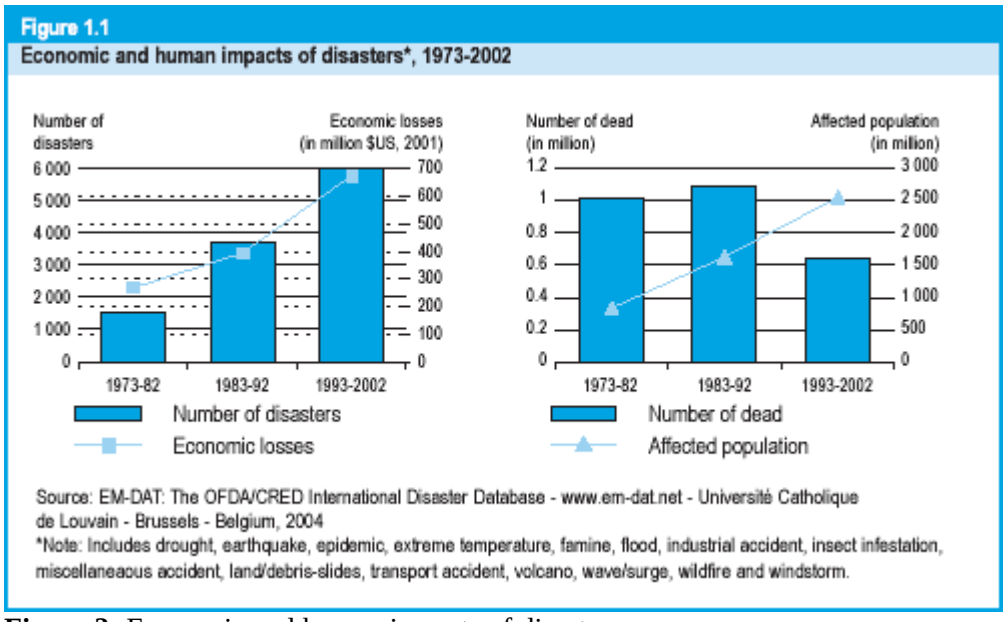

Figure 2: Economic and human impacts of disasters

2.1.3 Disaster Management

Disaster Management involves not only the prevention of the listed disasters but also involves the responses after such disasters occur. Most governments seem to take disaster management to mean their preparedness in the event of a disaster occurring. The government of Botswana identifies the following as elements of disaster management: mitigation, preparedness, response and recovery, and development. It is instructive to note that the

element of development "relates to the overall objectives of poverty alleviation, economic growth, the establishment of social justice and economic independence, and the sustainability of these over time".(GoB, 1996). This means that the government recognizes that the development process must take into account disaster management. Kötter (2004) has presented a model specifically for land administration in which the first port of call should be an assessment of risk and analysis of vulnerability. (See Fig 3 below)

Figure 3: Key elements of disaster management

3. DEVELOPMENT PROCESS

3.1 Development process in Botswana

The development process in Botswana is dependent on the Land Tenure system because the laws applicable to the development will depend on whether land is held as State or Tribal land.

3.1.1 Tenure System

The land tenure system in Botswana is divided into three categories namely, Tribal Land Tenure, State Land Tenure and Freehold Land Tenure. Current statistics indicate tribal land to comprise 70.9%, state land and freehold land comprise 24.9% and 4.2% respectively of the total area of Botswana (Revised Botswana National Land Policy p.32) (GoB,2004).

Tribal Land Tenure can be subdivided into two categories. Land can be held under Customary or Common Law land tenures. Under Customary Law, tribal land is allocated for

residential purposes, agriculture and for boreholes. Where Common Law is concerned, allocation is made for residential and commercial purposes.

State Land Tenure applies mostly to urban areas under Fixed Period State Grants (FPSG) and Certificate of Rights (COR's). In tribal areas, under Part 5 of the Tribal Land Act (TLA), ownership of a piece of land may be transferred from the Land Board to the State if the President determined and required that its ownership was in the public's best interest.

Freehold Land Tenure occurs where land is privately owned. Ownership of this type was only given prior to Botswana's independence.

3.1.2 Stakeholders and the Instruments of the Land Development Process

The stakeholders in the land development process in Botswana can be divided into three categories, state land, tribal land and freehold land. Where state-land is concerned, the Ministries of Lands and Housing and Local Government are the custodians of the land. Under this ministry, the major stakeholders are the Department of Town and Regional Planning which deals more on land-use issues and the Department of Surveys and Mapping which deals with issues of land allocation. Another state role player is the Registrar of Deeds. Where tribal land is concerned, the major stakeholders are the individual rural land authorities with their power to the land vested with the Land Boards. District Councils take on the duty of management of land policies. Freehold property is found mainly around peri-urban areas. Most of these properties are privately owned by absentee landlords and are rarely put to good use. Examples that can be cited include the Ghanzi, Lobatse and Tuli Block Farms, Mokolodi and Crocodile Pools.

Instruments used to promote orderly growth in both urban and rural areas primarily include the Town and Country Planning Act (TCPA) of 1977 and Tribal Land Act (TLA) of 1959 respectively. In cases where there are privately owned rights to land under Common law, the State may acquire land under the Acquisition of Property Act (APA) although hardly ever used. When part of any tribal area has been declared a planning area, the TCPA is the principal act in force and overrides the TLA.

Within declared planning areas, the TCPA, the Urban Development Standards of 1992, in conjunction with the Development Control Code of 1995, are the main tools guiding the land development process. In tribal areas, as mentioned above, the principal guiding tool in land development is the TLA, but where declared a planning area, the principal guiding tool is the TCPA. It is important to note that the roles played by all stakeholders are different and guided by different authorities also reporting to different higher authorities. Hence the two Acts sometimes conflict on land use issues and this is seen from certain land boards who are used to making their own decisions without referrals to the TCPB continuing to allocate land without following TCPB approved land development plans. Such actions result from change of land use being something commonly dealt with by the land boards and the TLA (section 27(1)) giving the land boards the authority to do as such.

3.1.3 Current Land Development Processes and Trends in Botswana

In urban areas, the land development process starts with the declaration of an area as a planning area by order of the Minister for Lands and Housing, published in the Botswana Government Gazette. Soon after, the Minister has a survey carried over the area. Within a period of two years of the area being declared a planning area, the Minister prepares a report of the survey together with a development plan indicating the manner in which the planning area should be developed and the stages by which the developments shall be carried out. The development plan would include in as much detail maps and other descriptive matter pertaining to current development status, currently identified planning issues, infrastructure location, utility availability, development proposals, plan implementation, costing and so on. (Costing of development plans is a new phenomenon and generally has not been done in Botswana).

The development plan process is designed to be a continuous, flexible process permitting modification and revision. The process aims at establishing methods and frameworks that promote development in a desired direction. The land development process is an eleven step process and these steps include:

1. Broad assessment of context and framework
   - Determined by the planning area and administrative structure and coincides with urban boundaries. It also involves district councils of adjacent peri-urban areas.
2. Formulation of goals and objectives
   - Local authorities and the public formulate goals and objectives of a development plan. Planners also play an important role in the process.
3. Data collection and data analysis – data collected can be of the following nature:
   - Land use and ownership, Physical conditions and constraints, Population and housing, Economic activities and employment, Transportation, Infrastructure, Community services, Regional interaction
4. Identification of issues and review of goals and objectives – this is also the time the report of survey by the Minister is looked at.
5. Consultation
   - Emphasis in the formulation of a development plan is placed on public participation. Stakeholders in the consultative process may include – government, local authorities, parastatals, private sector etc.
6. Preparation of alternative proposals – topics might include:
   - Constraining issues, Population and housing, Employment, Transport, Infrastructure, Community needs, Finance, Other policies
7. Evaluation of alternatives and selection of a final proposal
   - Draft development plan
8. Consultation
   - Full consultation with government, local authorities, parastatals, public
9. Plan approval – this is a four stage process and includes:
   - Submission of draft plan to Minister
   - Period for representation and objections
   - Amendments

– Final draft submitted for approval
10. Plan implementation
11. Monitoring and review.

A complete description of the process can be obtained from the physical planning handbook (DTRP,2000)

Land development in a planning area is completed in phases as in most cases the boundaries of the planning area far exceed the current settlement limits. Land development in areas that have not been developed follows the following stages:
1. Design in accordance with set Urban Development Standards(1992)
2. Setting out of the layout
3. Setting out of infrastructure network as per design schedule on the ground.

The ideal situation would have disaster management issues incorporated at development plan stage so that they can be appreciated and become an integral part of the whole land development process. As has been contended by this paper, these are not part of the process. The authors also note that the disaster management policy document states that there shall be a national disaster plan which would indicate how disaster mitigation can be incorporated in development planning. This however does not appear to be followed strictly in the development of land.

The Town and Country Planning Board, is a board constituted under the Town and Country Planning Act responsible for the control of developments in all areas that have been declared planning areas. The Board comprises representation from Ministries of Lands and Housing, Local Government, Health, Agriculture, Works and Transport, Trade and Industry, the Attorney Generals Chambers and National Conservation Strategy Coordinating Agency. The activities of these Ministries and government departments are deemed to have a direct impact on the town and country planning process. In addition to the membership stated above, three members are drawn from a private sector pool of experts who have direct or indirect dealings with the planning process. The Boards main functions are to resolve and deliberate on applications for planning permission as well as advise the Minister on matters on which the Minister may seek advice, particularly on the preparation or revision of development plans. The TCPB, for the most part, devotes itself to planning issues and not environmental issues with the exception when it talks about material considerations.

In rural areas, prior to the enactment of Land Boards as custodians of the land, traditional settlement patterns and informal standards of land allocation were the norm. Settlement patterns showed residential groupings (*dikgotla*) of extended families grouped into wards. Within the wards, circular clusters of houses each with a communal area (*lolwapa*), a shared open space (*patlelo*) by inhabitants of the cluster (Physical Planning Handbook for Botswana) were documented as early as 1801 by Samuel Daniel. Such settlement patterns are still seen in the centres of major villages in Botswana. During the initial stages of Land Board involvement in the land allocation process, when there was no assistance or involvement of land surveyors or physical planners, a transitional yet more organized settlement pattern was evidenced. This was marked by plots allocated along straight lines accessible from two sides,

with very little open space for recreational area and an abundance of access roads or tracks as sharing of boundaries was uncommon. In some areas grid-iron settlement patterns were used, but these lacked consistency with regards to feasible road widths and inconsistent plot dimensions.

Currently, where tribal land has been designated a planning area, Land Boards work with the District Land Use Planning Units (DLUPU), District Physical Planners and Council Planning Committees, the District Officer Lands (Ministry of Agriculture) to identify, determine land use patterns, collate and analyse survey data, demarcate then finally allocate plots of land of different land use in an organized manner and layout to the public. In areas that have not been declared planning areas, the land boards determine and follow their own land use plans that are independent of TCPA. Here the TLA is the principal act applied. In both situations mentioned above, the Land Board, having been vested with the interests of the people in the land, goes through a stringent consultative process with the public and other authorities relevant to land development on any developments that will occur and in some cases have to negotiate with the tribe to get land for such developments.

Where tribal land lies adjacent to urban areas, a high demand and pressure for land is experienced due to the population within the urban areas growing at a rate faster than that which serviced land can be provided and allocated within the urban area. Hence, situations of self land allocation, as has been experienced in Mogoditshane become the norm.(1)

When peri-urban areas are declared planning areas, the public, through a thorough and stringent consultative process is educated and sensitized on issues of their area being declared a planning area. This is done so that there can be continuity in the provision of quality infrastructure and utility services to them equivalent to and also experienced by residents in the urban areas. Only when the issues of this advantage are accepted can it be declared as such and only then can the TCPA be the principal act governing development and development trends.

3.1.4 Limitations or shortcomings of the Current Land Development Process

Limitations of the current land development process emanate from shortcomings and ambiguities found in the instruments governing land development. Also noted are conflicts between TCPA, TLA, other national policies on Agriculture and Tourism and also the lack of policies that serve to identify and protect susceptible environments or habitats and natural resources. Some examples that can be cited include:

1. The TCPA has a section on change of land use where a land owner can apply for change of land use from the District Council (where the application is reviewed by the Physical Planning Committee) without the need to inform the Land Board. The issue here is the Land Board has a lease on the property for a specific land use even though it ends up being used for something totally different.
2. On tribal land where consent is required for subdivision, the TCPA works in accordance with sizes as prescribed by the Minister under Section 31 of the Act. In most cases there is no regulatory framework governing the size of subdivisions e.g. in peri-urban tribal land. The law could provide that subdivisions of a prescribed size

could go ahead without permission, on the same terms as leases subject to certain standard terms and conditions.

A study (Ministry of Lands, Housing, 2000) commissioned after observing structural defects in houses in a town called Lobatse investigated the reasons behind the structural defects from a major construction project. Its findings indicated that the town is situated in an area with a complex geology comprising different rock types that have undergone displacement through faulting. It indicated that faults and other fracture zones were found to be primary contributors to the cause of massive cracks on structures. In addition, it identified that, as part of the project rested on what might be the lowest part of a valley, the accumulation of silts, differential settling due to buildings or structures lying on areas of different geological background as other causes.

The Act, in the preparation of a development plan does not give any specific guidance on issues of tests or surveys that need to be run to bestow the suitability of an area for any type of development. Currently the extent or magnitude of any surveys is dictated by circumstances as found on the ground e.g. the Lobatse and Maun Geotechnical studies.

Unlike the Botswana TCPA, the British TCPA of 1947, along which the Botswana TCPA is modelled, has since provided Government Planning Policy Guidance Notes (PPGs) on the interpretation of the Act, that are as good as law and must be adhered to. The Town and Country Planning Board appropriately interpret the TCPA in Botswana. Its interpretation is based on, in order of importance, precedent, court ruling interpretations, policies – mostly Land Development Code, Urban Development Standards and lastly legal interpretation of the Act with help from a representative of the Attorney Generals Chambers. The board is appointed by the Minister and only sits in an advisory capacity. The decisions of the Minister are final. The Board decisions at times can be overruled by the Minister as in one prominent case where a piece of land within a water catchment area was allocated for a shopping mall.(Lesetedi Land allocation Commission, 2004).

The Urban Development Standards meant to ensure a high quality physical environment also have some weaknesses. Firstly, development control is carried out at local Authority level and at this level there is lack of human capacity to adequately monitor and control developments. Secondly, lack of financial capacity impedes local authorities to work efficiently and lastly the lack of autonomy of the local authorities in their operations prohibits them from being proactive in effectively carrying out their duties. For instance, Section 18 (1) of the TCPA cites the Minister as the only person who can issue an enforcement notice.

4. THE WAY FORWARD

There is general consensus on what must be done. The Government on its part has since 1993 formed the National Committee on Disaster Preparedness. This committee was partly formed as a channel for the active participation of Botswana in the UN's International Decade of Natural Disaster Reduction (GoB, 1996). Government further recognizes the need for a disaster management programme that is consistent with its development objectives. (ibid).

Specifically with regard to land development there is need to incorporate the disaster management in the land development process. The disaster management cycle must come full circle before a development can be authorized. This means that the following steps need to be taken to ensure that this is achieved

4.1 Disaster Management cycle

A lot of land development takes place devoid of any soil or geo-technical investigations. It is assumed that an allocated piece of land is good for development. However, the question is whether or how much consideration at the planning stage is given to aspects such as geology, soil structure etc. It is not expected that private individuals need to carry out these studies for each development that they want to undertake. So, it becomes imperative that the planning authorities must come up with vulnerability and risk maps of planning areas. The model proposed here would essentially incorporate the land suitability studies in the planning process after which the planning authority would be able to adopt layouts that would have the least impact on the environment and would be the most technically feasible. This will require that legislation or policies on conservation and the environment be put in place, guidelines and standards governing land development be harmonized and codified to guide the decision making process of the Town and Country Planning Board.

To arrive at suitability will require that upon declaration of an area as a planning area the disaster management cycle would have to be part of the planning process. For instance in Botswana, with drought as the main disaster, there is need therefore to map the areas where this frequently occurs and as a result who is most likely going to be affected. This naturally requires the collection of historical data of past disasters and any socio-economic data that would help inform the proper mitigating decisions.

The components of disaster management have been given in Figure 3 above. The cycle of disaster management involves risk assessment, mitigation, preparedness and recovery.

4.1.1 Risk Assessment

This is perhaps the starting point in the disaster management cycle. Risk or vulnerability as shown in Figure 1 involves the determination of human loss, ecological and property damage. It would involve the estimation of such a loss in the event that a disaster was to occur. Varnes (1984) defines risk as the "the expected number of lives lost, persons injured, damage to property and disruption of economic activity due to a particular damaging phenomena for a given area and reference period." The United Nations (2004) also defines risk as "*The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions."* The conventional notation for risk:

$$\text{Risk} = \text{Hazards} \times \text{Vulnerability}$$

Risk assessment would be able to deliver risk maps which will form the basis for risk reduction, risk transfer and preparedness planning (van Westen, 2004). This assessment can be effectively achieved if base data is available. This means that data collection methods such as remote sensing and the design of databases become important (van Westen, 2004). It is now given that with the progress in computing sciences there are methods available to help planners handle complex data. Methods such as the combination of GIS and Multi-criteria decision analysis have been well researched (for example in Joerin et.al, 2001) to come up with solutions for land suitability. Data requirements for risk assessment in the land development process might involve the following

- An environmental susceptibility evaluation of the area with emphasis on mapping ecosystems, flora, fauna in line with the goals of the National Conservation Strategy, Tourism and Agricultural policies. It is worth noting that the government intends to incorporate environmental issues in the district and urban development plans through the state of environment reports.(NSCA, 2004)
- Evaluation of the geology of an area to determine suitability and impact on settlement or construction.
- Geotechnical and soil investigations will be a requirement to ascertain the suitability and strength of the ground in supporting structures of different magnitudes
- An evaluation of the topography is important in that potential hazards such as desertification, drainage flows and patterns etc can be identified and mitigated against.
- Rainfall data over the last 50-75 years should be gathered and analysed to identify any patterns that might predict drought, periods of floods, high water levels etc. This will help in identifying potential flood zones where no allocation of land should be made. This data would also be used in the design aspect of the subdivision area in terms of determining runoff, road drainage outlet and other drainage information.

One can look at the integration of disaster management in the land development process by looking at the individual steps in the land development process and appropriately applying pre and post disaster issues. Table 1 below illustrates the concept.

Table 1: Land development and disaster management

Land Development Stage	**Land Development Issues**	**Assessment**	**Mitigation**	**Preparedness**
Land acquisition through declaration	1. Survey	-Suitability Studies -Susceptibility studies e.g. EIA		
Development Plan	1. Current development status 2. Planning issues 3. Infrastructure location 4. Utility availability 5. Development proposals 6. Plan implementation 7. Costing	-Suitability Studies -Susceptibility studies e.g. EIA -risk determination	-Land use planning -Land management	
Development Plan Implementation	1. Design to Development Standards 2. Design setting out 3. Infrastructure design and layout			1. Compliance of design to suitability study 2. Compliance of layout with positional tolerance to flood lines 3. Suitability of design to traffic and environmental and disaster issues 4. Compliance with general safety standards. 5. Early warning systems 6. Risk monitoring

There is need for stricter limits to be placed on residential and commercial development in hazardous areas such as vulnerable flood plains, hillsides prone to slippage or fault zones. Construction codes should ensure more resilient buildings as well as infrastructure that maintain essential services when disaster strikes. However because poverty rather choice drives people to live in disaster prone areas disaster prevention strategies should be integrated into overall development policies.

4.1.2 Harmonisation of Conflicting Laws and Policies

In order to harmonise and eliminate conflicts between the Acts used to guide land development, as has been recommended by the Review of Botswana National Land Policy, all Acts need to be reviewed, not individually, but collectively such that when read together, no issues of conflicts would arise.

Botswana currently has no environmental policy. Issues dealing with the environment are currently found in a number of different Acts and do not measure up to situations Botswana is confronted with today. Hence the need for a strong environmental policy that would also play

an important role in the land development process without being subservient to existing land development policies cannot be over emphasized.

The process of land development would also be enhanced by equal consideration of environmental issues as land use issues in the deliberations of the TCPB by inclusion to the TCPB in a permanent and participatory and not advisory role of an environmental expert.

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BIOGRAPHICAL NOTES

E. Tembo MSc Geodetic Engineering, KTH, Sweden (1993), BEng Land Surveying UNZA, Zambia (1987)
Currently Lecturer at the University of Botswana in the Department of Civil Engineering (since 2000). Has worked previously as Lecturer with the University of Zambia (1993-1999) and City Land Surveyor with the City Council of Lusaka, Zambia from 1988-1991

Julian V. Simela BSc. Land Survey Eng. Purdue University. USA (2003), Dipl. Mining, Haileybury School of Mines, Canada (1981)
Currently Staff Development Fellow in the Department of Civil Engineering, University of Botswana, Consultant in Engineering and Topographical Surveying. Has worked previously in Mineral Exploration (Coal & Water) (1981-1986), Engineering and Land Surveying (1986 – present)

CONTACTS

Mr. Julian V. Simela
Staff Development Fellow
Faculty of Engineering and Technology, Civil Engineering Dept.
University of Botswana
Private Bag 0022
Gaborone.
BOTSWANA
Tel. + 267 3554319, + 267 3971528, +267 71518941(mobile)
Fax + 267 3952 309
Email: simelajv@mopipi.ub.bw, mojulis2004@yahoo.com

Mr Emmanuel Tembo
Lecturer
Faculty of Engineering and Technology, Civil Engineering Dept.
University of Botswana
Private Bag 0022
Gaborone.
BOTSWANA
Tel. + 267 3554349
Fax + 267 3952 309
Email: Tembo@mopipi.ub.bw