

Global Assessment Report  
on Disaster Risk Reduction



A preliminary analysis of flood and storm  
disaster data in Viet Nam

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## 1. Introduction

Located in a tropical monsoon region, with a coastline of around 3,440km, combined with a diverse and complex topography, Viet Nam is prone to many different types of natural hazards, both hydro-meteorological, such as flood, storm, drought and heavy rainfall and geophysical, such as landslides and to a lesser extent, earthquakes. More than 70% of the population is estimated to be exposed to risks from such hazards. Besides recurrent impacts on human health, disasters affect multiple sectors, from agriculture to industries, from energy to education. From 1990-2009 the country suffered an estimated annual economic loss equivalent to 1.3% of GDP or USD3.85billion<sup>1</sup>. Population growth, combined with rapid socio-economic development, urbanization, pressures on natural resources and climate change, have increased the exposure and vulnerability of the population to these hazards and consequent disaster risk. These factors also hamper the accomplishments Viet Nam has made towards poverty reduction and in achieving the Millennium Development Goals.<sup>2</sup>

This research paper aims to provide a brief overview of the frequency, distribution and impact of floods and storms in Viet Nam through a preliminary analysis of the historical disaster damage and loss database over the past twenty years. It is a first attempt to describe a number of spatial disaster patterns and trends over time in Viet Nam. Two case studies, one the Mekong Delta and another on Quang Binh province, aim to show the potential for more in-depth analysis and the linkage with social data on poverty and education. The paper concludes by highlighting some conclusions and recommendations based on the findings.

## 2. Methodology

Currently, in Viet Nam there is no systemized methodology, a single tool applied or software for analysis of disaster data. Disaster damage data is collected by Government agencies through a parallel data collection and collation system operated by the Central Committee for Flood and Storm Control (CCFSC) under the Ministry of Agriculture and Rural Development (MARD) and by the General Statistics Office (GSO) under the Ministry for Planning and Investment (MPI)<sup>3</sup>. The data collected through the CCFSC system is commonly referred to as the Damage and Needs Assessment system or DANA. Currently under DANA, data is collected through one template containing more than 150 indicators. This data is collected and collated from the commune<sup>4</sup> up to the central level. At the central level it is stored by the CCFSC in a central DANA database<sup>5</sup>. The current software, however, has no proper data processing tools for further analysis.<sup>6</sup> Therefore for this research, it was decided to use DesInventar software<sup>7</sup> and import the disaster data stored in the DANA database and undertake data-mining and restructuring. As a result, a historical disaster database was created containing provincial disaggregated data on indicators for 63 provinces and cities for the period 1989-2010 making spatial and time analysis of the disaster data was possible.

The researchers faced a number of constraints while carrying out this preliminary analysis. These derive from: the existing DANA system and the consequent conversion to DesInventar; the splitting and merging of administrative units; the fact that over the time period examined, only forty indicators were collected consistently; there is a strong focus on intensive risk rather than extensive risk; hazards - such as drought, forest fires, saltwater intrusion and earthquakes have been excluded or inconsistently included; there is assumed misinterpretation and resulting overlap of indicators by data inputters over

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this time period; data collection<sup>8</sup> and management capacities at lower administrative levels vary from province to province and over time; data storage systems have been inconsistent and often local data was not available electronically.

Taking into account these constraints, a threefold analysis was carried out resulting in a composition, temporal and spatial analysis. The composition analysis shows the value of a variable for each type of event. The temporal analysis shows the behavior of an indicator over time. The spatial analysis shows indicators in a map form and allows geographical analysis.

### 3. Viet Nam disaster profile

The sections on temporal trends and spatial distribution patterns aim to provide an overview of disasters affecting Viet Nam and their observed impact on the population (deaths) and community infrastructure (houses) over a period of twenty years, from 1989 to 2010.

Figure 3.1 shows the different types of disasters that have occurred over the last twenty years in terms of number of datacards or reported events<sup>9</sup>. Flood is the most reported with 48% of the total datacards or records. Following floods, the most reported events are hailstorms (20%), storms (13%) and flash floods (7%). Cyclones (typhoons), landslides, heavy rain and other events combined account for 12% of the reported events in the historical disaster database for this period.

Figure 3.2 shows the proportion of each type of event in terms of number of deaths and in terms of houses destroyed and damaged. Floods account for 67% of deaths. Other disasters account for a much smaller proportion of the total number of deaths with hailstorm, storm and flash flood each accounting for 7%. These four disasters, together with flood are responsible for nearly 90% of loss of life. As illustrated in the chart on houses destroyed and damaged, the disasters causing the most damage are, in the majority of cases, storm (36%) and flood (32%). Three other disasters with significant impact on houses are heavy rain, flash flood and hailstorm (11%, 9% and 9%, respectively). Other hazards recorded show negligible impact (1%) on houses.

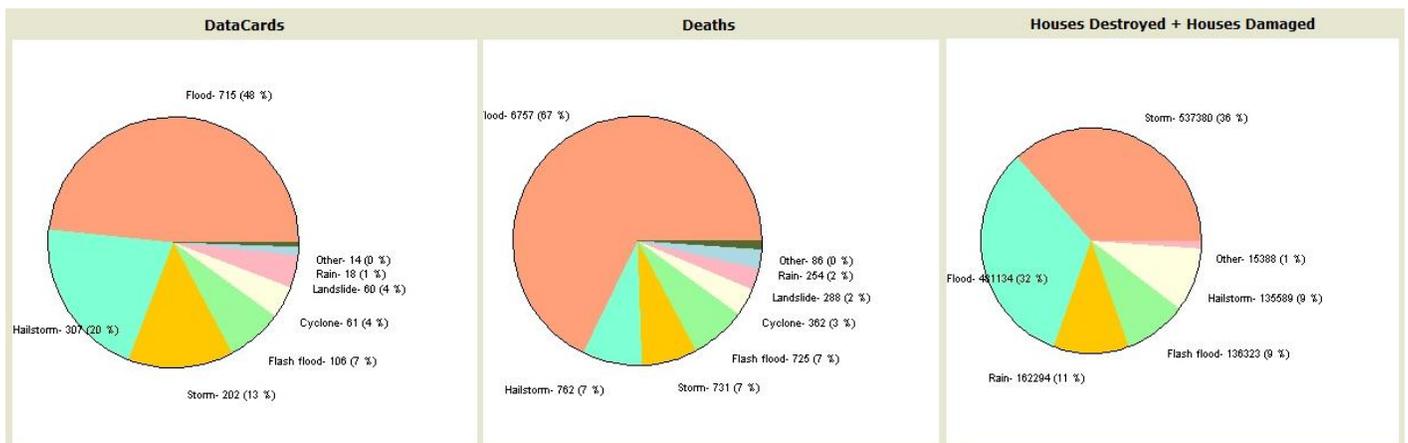


Figure 3.1 Proportion of disasters in terms of number of datacards or reported events

Figure 3.2 Proportion of disasters in terms of number of deaths

Figure 3.3 Proportion of disasters in terms of number of houses destroyed and damaged

#### 4. Temporal trends and spatial distribution patterns of disasters

Figure 4.1 shows the overall temporal trend of all types of disaster occurrences for the period 1989 to 2010 and highlights floods and storms in particular. Over this period, there is an increasing trend in the number of datacards reported. The highest number of datacards, or reported disaster events, was in 2006 (127 datacards), followed by 2008 (123 datacards), and 2005 (114 datacards).

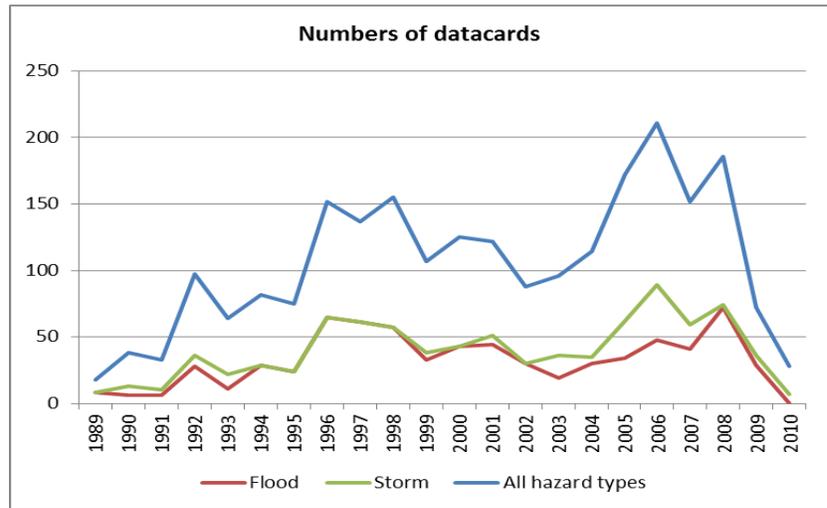


Figure 4.1 Number of datacards for all disaster types, floods and storms

Figure 4.2 shows the temporal trends for all types of disasters and floods and storms in particular for the number of deaths. There is an increasing trend towards 2000, after that the trend is reversed and fewer annual deaths are recorded.

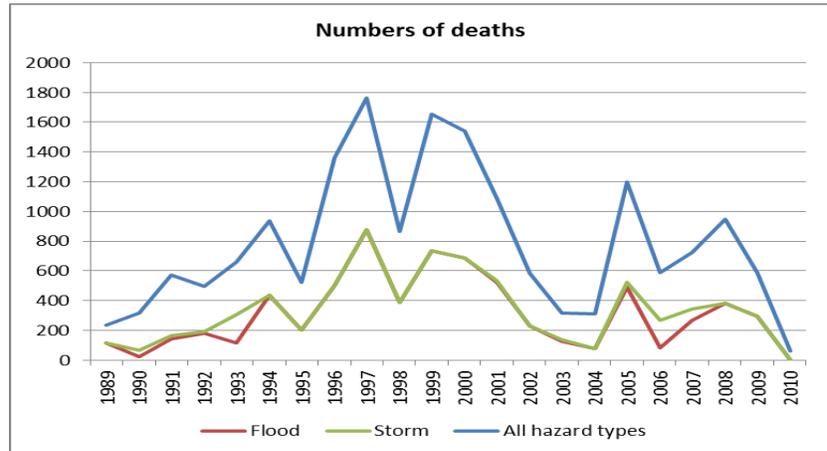


Figure 4.2 Number of deaths for all disaster types, floods and storms

Figure 4.3 shows an increasing trend of damage to housing for all disasters in general and for storms in particular. The chart also shows a notable number of houses were destroyed and damaged in 2006 (215,856 houses) but also in 1997 (109,930 houses), 1999 (83,078 houses) and 2002 (152,653 houses), mainly due to storms but also other disasters.

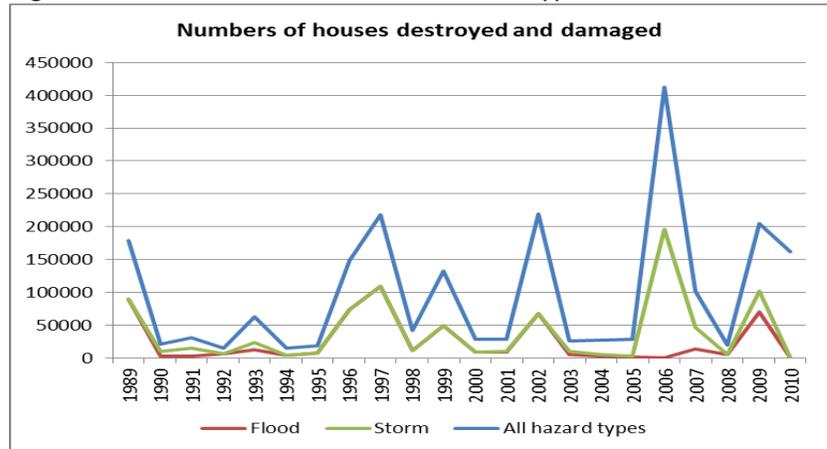


Figure 4.3 Number of houses destroyed and damaged for all disaster types, floods and storms

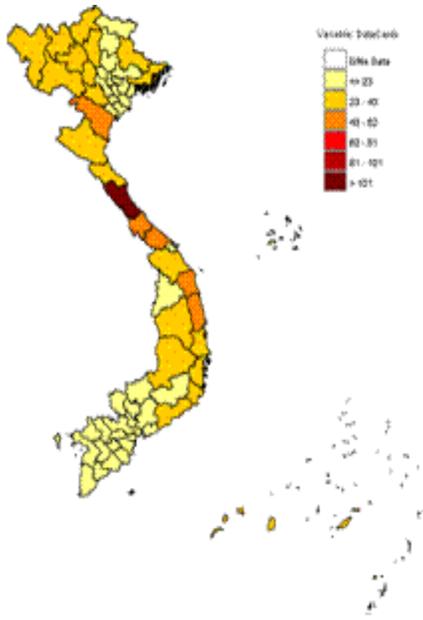


Figure 4.4. Spatial distribution of reports for all disaster types

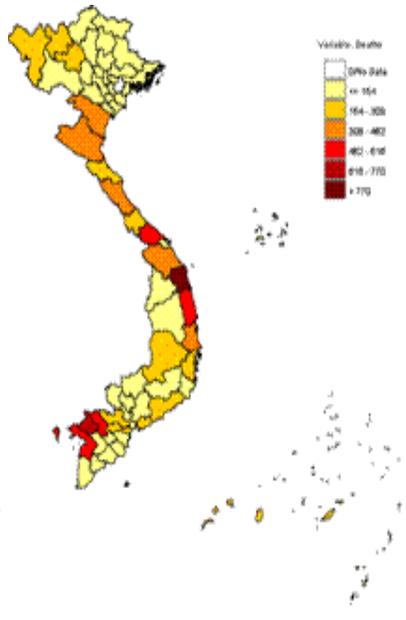


Figure 4.5. Spatial distribution of deaths for all disaster types

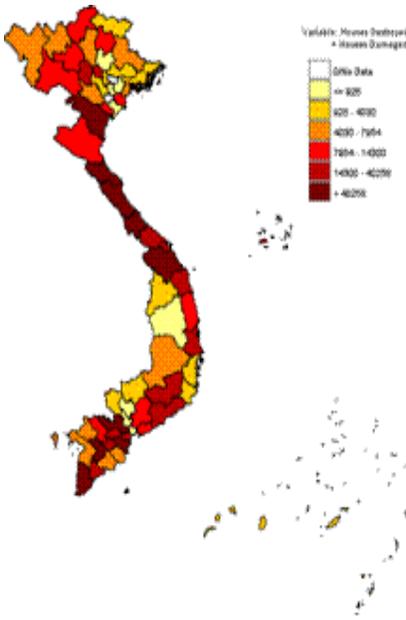


Figure 4.6. Spatial distribution of houses destroyed and damaged for all disaster types

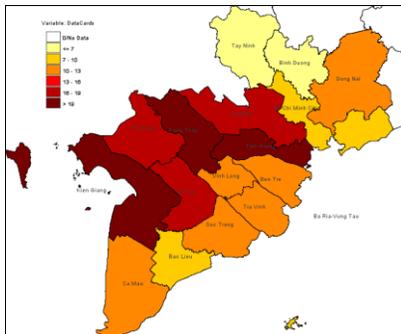
The map in Figure 4.4 shows that over this twenty-year period Quang Binh province in North-Central part of the country, was the most disaster prone, as indicated by the largest number of datacards (121) or reported events. Five provinces placed in the next group are Thanh Hoa (46 datacards), Quang Tri (52 datacards), Thua Thien Hue (59 datacards), Quang Ngai (62 datacards) and Binh Dinh (51 datacards). Overall, the provinces most affected by all types of disasters are located in Central Viet Nam.

Figure 4.5 shows that Quang Ngai province had the highest number of deaths caused by all disaster types over the same period, with 924 fatalities. Next are: Thua Thien Hue (572), Dong Thap (518), Kien Giang (570) and Binh Dinh (589). As observed from both maps, several provinces in the Mekong River Delta suffer from a high number of deaths due to all disasters types compared with other provinces but have a smaller number of datacards - or less events reported - than the average. *[Further detailed findings on this region are discussed in Case Study 1 below].*

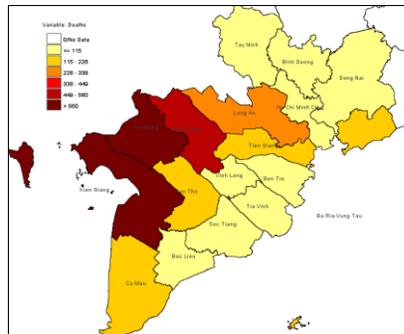
Figure 4.6 shows that over this same period, the provinces with the most houses destroyed and damaged due to all disaster types are Quang Binh - with 331,055 houses destroyed and damaged, Thanh Hoa with 103,646 and Ha Tinh with 96,172. The province with the most houses destroyed is Thanh Hoa (97,383 houses) while the province with the most houses damaged is Quang Binh. The most impacted regions are the North Central and the Mekong River Delta.

### Case study 1. Mekong River Delta

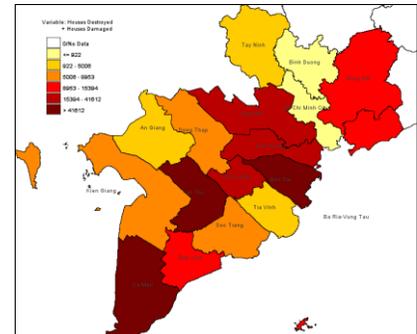
Comparing the proportion of figures for each disaster type, using the total number of datacards, deaths and houses destroyed and damaged specifically for the Mekong River Delta, different patterns of spatial distribution for each variable were noted. Figure (a) shows that provinces in the northwest of the Mekong River Delta, or the border region with Cambodia, face more disasters<sup>10</sup> than those in the coastal areas facing the East Sea, the southeast area in the map. Figure (b) shows almost the same spatial distribution pattern for number of deaths, in which inland and border provinces experienced more deaths than the coastal provinces. However, the pattern displayed in Figure (c) is different, with a higher number of houses destroyed and damaged recorded for coastal provinces compared to inland ones.



(a) Number of datacards for all disaster types

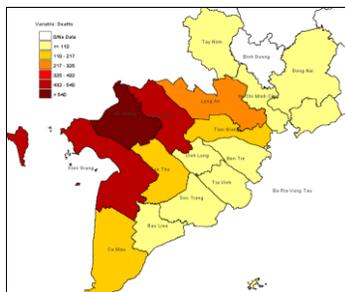


(b) Number of deaths for all disaster types

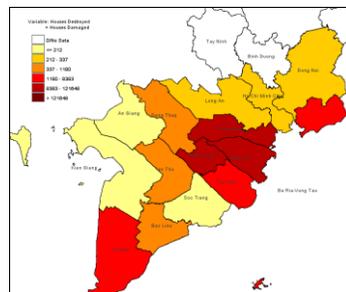


(c) Number of houses destroyed and damaged for all disaster types

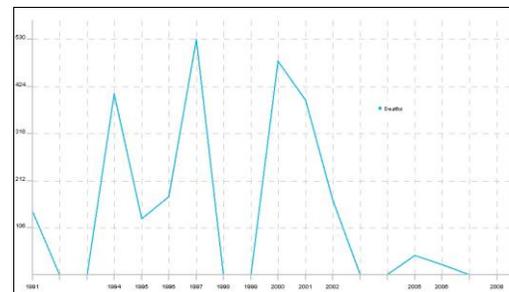
An explanation for this is the occurrence of different types of disaster events: inland provinces are more affected by floods while coastal provinces are more affected by storms. Each of these disaster events results in different types of damage as seen in Figure (d) and (e): floods caused more casualties while storms more damage to houses. Exploring the temporal profile of flood (Figure f) flooding does not happen frequently but when it does it is an intensive or more unusual event (such as the floods in 1994, 1997, 2000 and 2001). Storms only occurred once in 2006 (Typhoon Durian). The approach of 'Living with floods'<sup>11</sup> is applied to the Mekong Delta - meaning people have adapted, or are more prepared to deal with floods - rather than with storms. Storms therefore tend to cause more damage to human health, livelihoods and socio-economic infrastructure in this region.



(d) Spatial distribution of deaths caused by floods



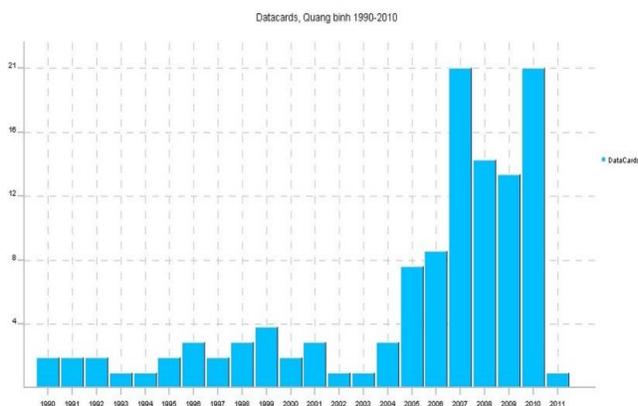
(e) Spatial distribution of houses destroyed and damaged by storms



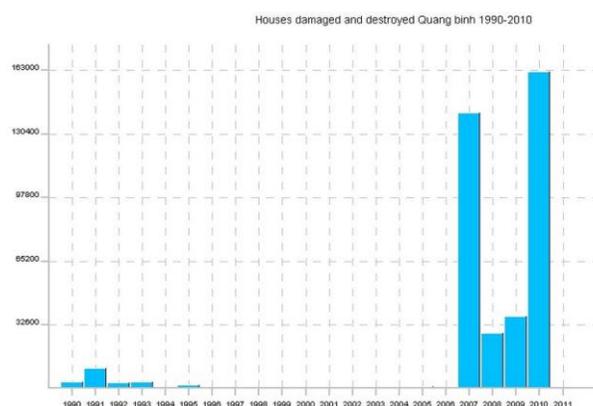
(f) Temporal profile of deaths due to floods

**Case study 2. Potential linkage between disaster damage and poverty in Quang Binh province**

As was seen in Figure 4.4, Quang Binh province, in the North-Central region, is one of the most disaster prone provinces in the country, impacted by floods, typhoons, storms, heavy rainfall and other smaller-scale disasters<sup>12</sup>. Based on preliminary analysis of historical data, over the past twenty years, floods have had the greatest impact. Besides floods, eight storms or typhoons affected the province causing a total of 51 deaths. As seen in Figures (g) and (h) there is a significant increase in number of datacards or reported events and number of houses destroyed and damaged over the last four years from 2006-2010.<sup>13</sup>



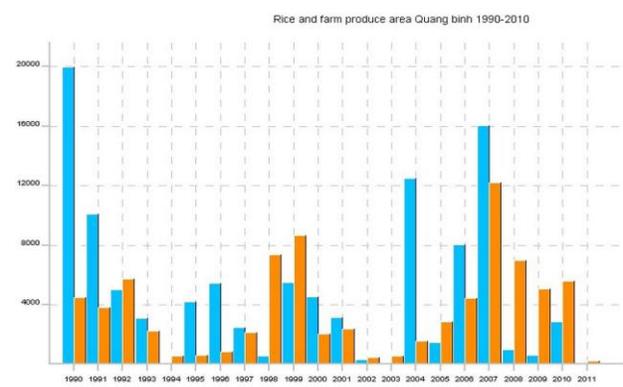
(g) Number of data cards for all disaster types



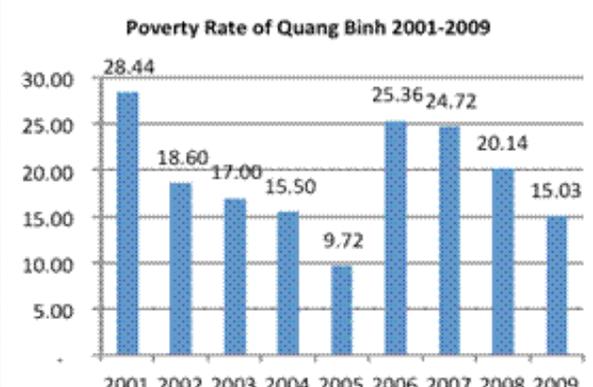
(h) Number of houses destroyed and damaged for all disaster types

Figure (i) shows the impact of all disaster types on rice and other farm produce. There is no clear trend but the graph shows a serious impact of disasters on agriculture, the major economic sector in Quang Binh, for different periods in time, including from 2005-2007.

Examining poverty rates over the last ten years (Figure j) there is a continuous decrease until 2005, but a sharp increase in 2006 compared to 2005 (from 9.72% to 25.36%). Taking into account the previous disaster data, including the impact on agriculture, this might indicate a linkage between the occurrence of disasters and their impact on livelihoods, particularly for specific sectors like agriculture. Further analysis of this linkage might provide important input into more effective disaster risk management but also poverty reduction programmes.



(i) Number of rice (blue) and farm (orange) produce damaged by all disaster types



(j) Poverty rate of Quang Binh 2001-2009.<sup>14</sup>

## 5. Conclusions and Recommendations

DesInventar as an analysis tool has proven its strength in archiving, mining and analyzing of historical disaster damage data. The preliminary analysis of the results undertaken provides an overview of disaster occurrences and impacts on people and housing. The two case studies undertaken have illustrated the potential for more in-depth analysis of other disaster prone geographical areas and also for linking disaster damage data with social indicators, such as those for poverty rate. Further analysis of data from lower administrative levels and from other sectors would provide additional layers to the analysis that could be a useful input into various components of disaster risk management, such as risk assessment, disaster profiling, localized and targeted disaster response interventions and early and long term recovery strategies.

As confirmed by the analysis, Viet Nam is frequently affected by many types of disasters; amongst them, flood and storm are the most serious and frequent disaster events causing loss of human lives and significant damage to housing and agricultural produce. Provinces in the North- and South-Central regions are most regularly affected by disasters, but other provinces in the North and the Mekong River delta have also seen severe damage, due likely to more extreme events.

Temporal trend analysis shows that there is an increasing trend in disasters recorded over the twenty-year period of the study (1989-2010) with varied impact on human loss and damage to housing. Extreme events have occurred also in this time period, as evidenced by several peaks in the data.

This first attempt at analyzing disaster risk trends and patterns over time and for specific locations in the country has given some useful insights and provides potential for further analysis on geographical distribution of disasters, specific trends per disaster, the underlying causes of risks, and the differing impact of disasters, etc. – all of which are extremely useful for disaster risk management and climate change practitioners and decision makers. Hence, a nationwide historical disaster damage database utilizing clear - and consistently collected - indicators and linked with other existing databases in the country, such as VietInfo<sup>15</sup> is needed.

At present, there is no database on disaster events in Viet Nam that covers all types and magnitudes of disasters and also provides information that can be compared across different geographical regions - at commune, district as well as at provincial levels. Once such a database is established and maintained, analysis of geographical panel data<sup>16</sup> could be conducted.

The current provincial level disaster damage database is unable to show evidence as to where and how investment could be made to the lower levels affected by disasters. There is a pressing need to establish and maintain a systematic, electronic data collection mechanism for disaster damage data at the district and commune levels. This would help to identify risk and to map out the relationship between disaster and poverty in the country. More effort, to explore the empirical relationship between disasters, vulnerability and poverty is also required. Such research would enable the impact of disasters on social indicators, particularly on poverty, to be ascertained and improved policy, strategy and plans to address this, developed.

## 6. References

- i. **Central Committee for Flood and Storm Control (CCFSC) Viet Nam – Disaster Database:**  
<http://www.ccfsc.gov.vn/KW6F2B34/Disaster-Database.aspx>
- ii. **Historical disaster information system in Sri Lanka – Preliminary analysis**, Disaster Management Center, Ministry of Disaster Management and Human Rights, Sri Lanka, 2007.
- iii. **DesInventar Server 7 – DesConsultar Analysis and Query Module: User’s Manual, Version 7.0.1**, LaRed and United Nations Development Programme, 2006.
- iv. **DesInventar Server 7 – Preliminary Analysis Methodology, Version 7.0.1**, LaRed and United Nations Development Programme, 2006.
- v. **DesInventar Disaster Inventory System – Methodological guide, Version 8.1.9**, OSSO-Grupo de Investigación and LaRed, 2009.
- vi. **Risk knowledge fundamentals: Guidelines and lessons establishing and institutionalizing disaster loss databases**, United Nations Development Programme, Regional Centre, Bangkok, Thailand, 2009.
- vii. **2009 Global Assessment Report on Disaster Risk Reduction: Risk and poverty in a changing climate – Invest today for a safer tomorrow**, United Nations, 2009.

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## Endnotes

<sup>1</sup> UNISDR Disaster Statistics 1991 – 2005 <http://www.unisdr.org/disaster-statistics/top50.htm>

<sup>2</sup> Viet Nam has halved its poverty rate, ensured gender equality with even higher targets and made primary education available to all. Promising results are also forthcoming from the healthcare sector, with people’s health being better protected. Viet Nam is making strenuous efforts to meet the goals of reducing child mortality and improving maternal health. The fight against HIV/AIDS, malaria and other dangerous diseases has also generated encouraging early results, although obstacles remain. Viet Nam fosters international integration and hopes to expand cooperation and partnerships for development, while trying to improve environmental protection and sustainability, *Millennium Development Goals 2010 National Report. Viet Nam. 2/3 of the way achieving the Millennium Development Goals and Towards 2015.*

<sup>3</sup> During and after disasters, data is collected mainly through the CCFSC system. At each level, province, district, commune and village, there is a committee on flood and storm control that gathers and collates data before it is sent to the level above. At the end of the chain, the central or national level, disaster data is published daily on the CCFSC website (<http://www.ccfsc.gov.vn>). The most common way to send information is via phone or fax when power permits. At the same time, the General Statistics offices (GSO) at each level collect and collate information in a similar way but through their own reporting system. At the national level, the data from GSO is publicized via their monthly bulletins, but their disaster database, containing fewer indicators than the CCFSC, is not publicly available. Depending on location, the individuals involved and most frequently at the lowest level, the CFSC and GSO staff responsible for data collection are in close contact with one another

<sup>4</sup> The lowest administrative level

<sup>5</sup> <http://www.ccfsc.gov.vn/dmis>

<sup>6</sup> The historical data in this database is only used for compiling annual reports or presentations. There is no systematic analysis of the disaster data or integration with other existing indicators on poverty, economy, health, education and other sectors.

<sup>7</sup> The software of the Disaster Inventory System or ‘DesInventar’ is an online conceptual and methodological tool for construction of databases of damage, losses and in general the effects of disasters. It is managed through free, open-source software, including multi-user, remote data entry and data querying, reporting and analysis. The DesInventar software has been used in more than sixteen countries and has also been applied for the development of the Global Assessment Report 2009 and 2011. <http://online.desinventar.org/>

<sup>8</sup> New disaster damage and needs reporting templates are currently being developed and will be further piloted in disaster prone provinces. Local statistical and CFSC staff at commune and higher levels will attend training on the use of these templates, which will, in time be applied nationwide.

<sup>9</sup> One disaster event can be represented by different provincial datacards as each datacard represents one particular province reporting on a particular disaster event. A higher number of datacards can, for example, be more of a reflection of the

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geographical impact of a type of hazard, e.g. floods, than of the actual number of hazards affecting the country. Still, the indicator, in terms of datacards, can show some trends and patterns.

<sup>10</sup> At the national level, each event may occur in several provinces so it may have several datacards; but at the provincial level, each event will have only one datacard for each province. So in this case, the term “event” and “datacard” have equal meaning. (see previous note)

<sup>11</sup> The Government of Viet Nam disaster risk management approach adopted in the Mekong River Delta is called ‘*living with floods*’ and focuses on pro-active flood and saltwater intrusion prevention, preparedness and response, while aiming to maximize the socio-economic benefits caused by regular flooding, *The National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020*,

<http://www.isgmard.org.vn/VHDocs/NationalPrograms/National%20Strategyfordisasterprevention2020.pdf>

<sup>12</sup> More recently, in October 2010, Quang Binh was affected by one of the largest floods in 60 years, claiming 58 lives and causing estimated damage of VND 2,352 billion (~USD 120 million), CCFSC, Annual Report, 2010.

<sup>13</sup> There is no data available for this indicator for the period 1996-2006 in Quang Binh province.

<sup>14</sup> Quang Binh Provincial Department of Social Protection (DoLISA)

<sup>15</sup> VietInfo is a nationalized version of DevInfo adapted by the Viet Nam General Statistics Office (GSO), UNICEF and UNDP. VietInfo 5.0 database is Viet Nam’s Development Database (VDD) with data from 1990 to 2003. VietInfo was updated in 2009, with sources from the Viet Nam Household Living Standard Surveys (VHLSS) and other sectoral surveys. VietInfo has been used for many purposes; for instance, to update Viet Nam’s progress towards achievement of the MDGs, to monitor the provincial Socio-Economic Development Plan, to monitor the Public Administration Reform Process and as a tool for data dissemination for urban management and disaster information. VietInfo is available in Vietnamese and English and can be accessed at: <http://vdd.gso.gov.vn/>

<sup>16</sup> Geographical panel data is a dataset collected by different surveys covering same geographical regions that could be used to conduct analysis to measure impacts.