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Assessing climate change induced displacements and its potential impacts on climate refugees: How can surveyors help with adaptation?

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overview

- Introduction
- Definition
- Methodology
- Literature review
- Case studies
- Results and discussion
- Conclusions

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Introduction

- About 23 years ago UNEP reported that as many as 50 million people could become environmental refugees by 2050 if the world did not act to support sustainable development
- The linkages between climate change and forced migration is highly contested by some policy analysts and researchers (Renaud et al. 2007; Keane 2004). Climate cannot be sued
- Climate refugee has no recognition in international refugee law - environmental conditions do not constitute a basis for international protection (Boano et al, 2008).

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Introduction

- The 1951 UN convention and 1967 Protocol on the Status of Refugees (UNHCR, 2006) is well established, but do not clearly offer protection for those affected by environment.
- Recent climate induced disasters such as flooding, storm, draught and sea level rise clearly shows that the issue must be taken seriously.
- The focus of this paper is three-pronged.

1. to assess the reality of climate refugees,
2. To relate the outcome of the first assessment to the existing adaptation policies to identify vulnerability,
3. To examine possible contributions surveyors could offer in the development and implantation of the adaptation strategy.

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Definition

- El-Hinnawi (1985), Myers (2002) and IOM (2007)provides broader definition of 'environmental refugees to include not only climate displacements, but also tectonic induces displacement such as earthquakes, landslide and subsidence.
- In this paper climate refugees refer to persons who are displaced by environmental conditions which are influenced by climate change only (e.g. droughts, cyclone/monsoon, rainfall induced-flood, sea level rise and intense icy winters) and can no longer gain a secure livelihood in their homelands/habitats and therefore migrate.

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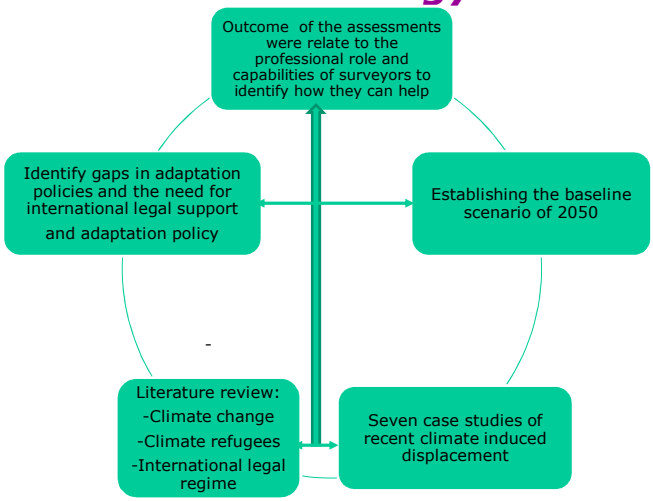
Methodology



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Literature review

- IPCC 2007 indicated with certainty that climate change will cause more frequent and severe disasters, such as droughts, floods, storms, and hurricanes (cyclones and typhoons) in the next 100 years.
- The four susceptible zones to climate change are low-lying coastal settlements; rain-fed farming regions and those dependent on rivers fed by snow and glacier melt; sub-humid and arid regions; and humid areas in Southeast Asia are vulnerable to changes in monsoon patterns

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Literature review

It is anticipated that rising sea levels will displace hundreds of millions of people in developing countries by the end of the century (Fritz, 2010).

Vulnerable Maldives Islands in the Indian Ocean. Photo: danksy/flickr

Erosion doubles along Alaska's Arctic coast. Photo: coastal care

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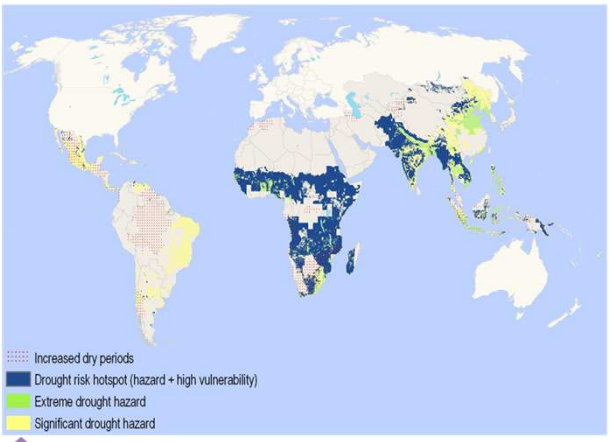
Literature review

- **Drought risk hotspot in the world** (Source: Ehrhart et al, 2009)



Drought-risk hotspots are mainly located in sub-Saharan Africa; South Asia, particularly Afghanistan, Pakistan and parts of India; and South East Asia, particularly Myanmar, Vietnam and Indonesia.

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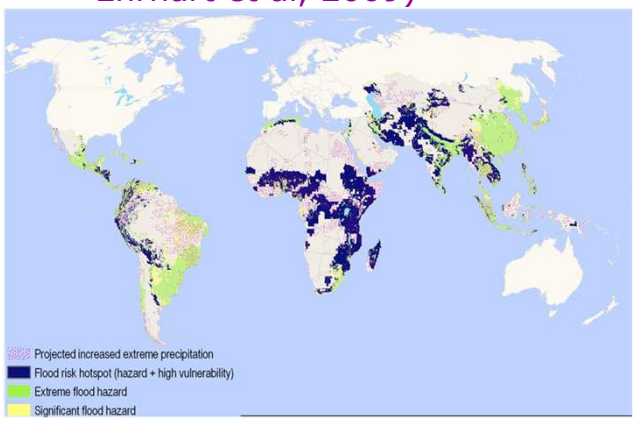
Literature Review

- **Flood risk hotspot in the world** (Source: Ehrhart et al, 2009)



•**Flood-risk** hotspots occur in Africa, including the Sahel, the Horn of Africa, Great Lakes region, Central Africa and Southeast Africa; Central, South and Southeast Asia; and Central America and the western part of South America.

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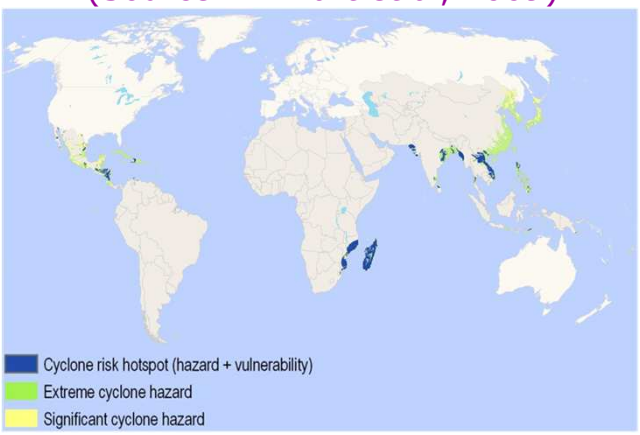
Literature review

- **Extreme weather hotspot in the world** (Source: Ehrhart et al, 2009)



•**Cyclone-risk** hotspots include Mozambique and Madagascar, Central America, Bangladesh, several parts of India, Vietnam and other Southeast Asian countries. As the range and intensity of cyclones increases, so too will the number of communities at high risk. This will include communities' further in-land that are not used to coping with such hazards.

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Literature review

Estimates and forecasts of the number of people displaced by climate changes

Source	Estimates at the time of publication of the report	Predictions by 2010	Predictions by 2050
UNEP (Tolba, 1989; Milan, 2004)	30 million	50 million	-
Jacobson (1988)	10 million	-	-
Myers (1993, 2002)	25 million	-	150, then 200 million
Myers and Kent (1995)	25 million	50 million	212 million
Red Cross (2001)	More than people displaced by war	-	-
UNU-EHS (Adam 2005; Renaud et al., 2007)	10 million/year	50 million	200 million
Stern (2007)	-	-	150–200 million
Christian Aid (2007	25 million	-	300 million
Biermann and Boas (2010)	-	-	200 million

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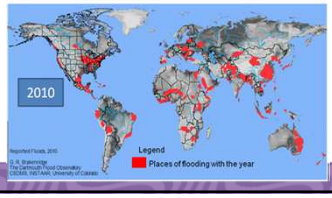
Increasing global flood risk

There are compelling cases worldwide that suggest that wet places are getting wetter while dry places are become drier due to climate change. By 2050, annual average river runoff and water availability are projected to increase by 10-40 percent at high latitudes and in some wet tropical areas. The frequency of heavy precipitation events is also likely to increase over most land areas (IPCC 2007).



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Case studies, in 2011 only

Brief News about the Flooding	Evidence of Flood Devastations
Date: November 2011 **Headline: Northern Italy inundated many dead** Heavy rains with insufficient runoff channels have apparently been the cause of this catastrophe. Damage to property and disrupted business will take months to even calculate. Seven people have been killed in Genoa after flash floods devastated the port city. Thousands of people in low-lying areas near Turin have been told to leave their homes, while the city's schools, as well as those in Milan, were ordered to close. ***Source:*** *World disaster report, November, 2011*	 Flooding at Turin, Italy (photo: Fausto Guzzetti)  Flooding at Genoa, Italy (photo: Black Panther)

Case Study 1, 2011 Flooding in Genoa and Turin, Italy

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Case studies

Brief News about the Llooding	Evidence of Flood Devastations
Date: June 2011 **Headline: Torrential rain began to lash Hubei, Hunan, Jiangxi, and Anhui provinces.** The rainfall triggered floods and landslides which had forced over 55,000 people to evacuate their homes. Previous heavy rainfall had already caused widespread destruction in Xianning, leaving dozens dead. The Ministry of Civil Affairs says flooding and landslides triggered by an earlier two rounds of rainstorms. The flooding had left 105 people dead, 100 injured and 63 more missing in the south over the past 10 days. **Source:** Global time.CN, June 2011	 Flooded village at Hubei (Photo: Global time.CN)  Flooded town at Zhejiang (Photo: Global time.CN)

Case Study 2, 2011 Flooding at Hubei and Zhejiang, China

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Case studies

Brief News about the Flooding	Evidence of Flood Devastations
Date: September, 2011 **Headline: Flood Water in New York, Pennsylvania** Officials in north-eastern Pennsylvania called for a mandatory evacuation of more than 100,000 residents living along the Susquehanna River on Thursday due to expected flooding. Emergency management officials in Broome County ordered additional evacuations early Thursday for Binghamton neighbourhoods near where the Susquehanna and Chenango rivers converge. Mandatory evacuation orders were also issued for the neighbouring villages. **Source:** The Blaze (Associated Press, AP), September, 2011	 Flooding at Pennsylvania, USA (photo: AP)  Flooding at Bringhamton, USA (photo: AP)

Case Study 3, 2011 Flooding at Pennsylvania & Bringhamton, USA

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Case studies

Brief News about the Flooding	Evidence of Flood Devastations
Date: September, 2011 **Headline: Severe floods in Sindh:** Torrential rains have strucked southern Pakistan in recent days, causing at least 209 dead so far and 5.3 million displaced in the province of Sindh. Rescue operations and emergency efforts are slow due to the difficult weather conditions and flooded lands. In 2010, Pakistan's worst flooding in nearly a century affected more than 14 million people and left at least 1,600 dead in the same area, UN said. The Chinese embassy in Pakistan has promised support for 4.7 million dollars to deal with the emergency and help the victims in Sindh. Prime Minister Yousaf Gilani has confirmed that about 700 thousand houses are damaged; at least 150 thousand people who have sought refuge in emergency centres are in need of immediate assistance. **Source:** AsiaNews, August, 2010	 Flood Victims at Sindh Province, (photo: Reuters)  Call for rescure at Sindh Province, (photo:Reuters)

Case Study 4, 2011 Flooding at Sindh Province, Pakistan

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Case studies

Brief News about the Flooding	Evidence of Flood Devastations
Date: September 2011 **Headline: Orissa has become a victim of climate change** Flooding has left at least 26 people dead and about 200,000 others homeless in the eastern Indian state of Orissa. An Indian official announced, "we have evacuated 193,000 people to relative safety." Torrential monsoon rains caused water levels to breach river banks and trigger the floods in the region. Officials warned that the death toll was likely to rise and noted that a total of 2.1 million people in the state of 40 million people had been affected by the flood. Meanwhile, the Indian Navy deployed warship to the area to carry out relief missions and dispensed over 30,000 kilograms of relief supplies to the disaster-stricken public. **Source:** Press. TV, September 2011	 Flood victims at **Orissa** (photo: Press.TV)  Flood displacement at **Orissa** (photo: Press.TV)

Case Study 5, 2011 Flooding at Orissa, India

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Case studies

Brief News about the Flooding	Evidence of Flood Devastations
Date: January 2011 **Headline: Australia flooding could continue for weeks.** Water up to 16 metres deep has flooded towns and roads. Sydney-based freelance reporter Peter Hadfield said. The rain eased Thursday, but river levels continued to rise in many locations and the Queensland disaster management agency said some areas are still bracing for more flooding. The crisis has been triggered by Australia's wettest spring on record. At least six river systems across Queensland have broken their banks. The floods have killed 35 people and have displaced about 200,000 people, and many homes have been evacuated. **Source:** CBC news, January 2011	 Arieal view of Queensland flooding, Australia (photo: CBC news)  Displaced neighbourhood by Queensland flooding, Australia (photo: CBC news)

Case Study 6, 2011 Flooding at Queensland, Australia

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Case studies

Brief News about the Flooding	Evidence: Photos of the Flooding Devastations
Date: November 2011 **Headline: An epic drought has been cast upon countries like Kenya, Ethiopia, Somalia and Uganda.** The severe drought, that now occurs year on year, has lead to severe shortages of not only water, but food and livestock. This has displaced over 360,000 people to refugee camp in Dadaab. It is estimated that 23million people are threatened by the crisis. The most severely affected area encompassed the semi-arid regions of eastern and northern Kenya, western Somalia and some southern border areas of Ethiopia. The drought developed in parts of east Africa in late 2010 and continued through most of 2011. Over eastern and northern Kenya; it was the driest 12-month period on record at some locations within the region. This has led to the death hundreds of peoples, thousands of livestock and loss of livelihood and migration. **Source:** The watchers, November, 2011	 Severe drought killed live stock in Kenya (photo: Global Changes)  Severe drought causes water shortage in Addis Ababa Ethiopia, (photo: Red Cross)

Case Study 7, 2011 Drought at Some East African Countries

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Summary of the case studies

Case study number	Location	Number of death reported	Number of displaced people
1	2011 flooding in Genoa and Turin, Italy	10	Greater than 1000
2	2011 flooding at Hubei and Zhejiang, China	105	55,000
3	2011 flooding at Pennsylvania & Bringhamton, USA	15	100,000
4	2011 flooding at Sindh Province, Pakistan	1,600	5.300, 000
5	2011 flooding at Orissa, India	26	193,000
6	2011 flooding at Queensland, Australia	35	200,000
7	2011 drought at some East African countries	Several 100	360,000
Total		**> 1,891**	**> 6, 209,000**

> Greater than

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Results and discussion

- The summary of the case studies revealed that in 2011, flood and draught disasters from just seven case study areas, caused over 2000 death and over 6.3 million displacements.
- Significant number of the displaced people (about a million) from less economically developed countries could be climate refugees.
- Dealing with the issue of climate refugees is highly complex, and potentially expensive, with some countries and global organisations already overwhelmed by the demands of the 1951 conventionally-recognised refugees.
- Evidence from both the literature and the case studies clearly demonstrate that impacts of climate change have been causing massive displacements, humanitarian emergencies and climate refugees over the past decade

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Climate Refugees' Adaptation Policies

- Develop a charter the will offer some international protection or assistance to climate refugees
- Pursue disaster-risk reduction particularly at the vulnerability communities rather than just reacting to emergencies. Set up both national and international funds for climate refugees.
- Promote and encourage migration as one of the adaptation response to some vulnerability. Migration has been prominent historical adaptation strategy to environmental change. The current barriers to migration have to be relaxed for migration to achieve its full potential as an adaptation strategy, particularly, for vulnerable small island states in the Pacific Ocean.

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Climate Refugees' Adaptation Policies

- Develop faster and efficient response strategy towards disaster. Invest in early warning systems, drought and flood resistant crops and build elevated storm shelters with flood and medical storage at vulnerable communities.
- Pursue strategies that do not only prevent displacement at the origin of climate refugees, but also develop policies that build capacity at the destinations to facilitate accommodation and integration of the additional population.
- Support capacity building and climate change adaptation initiatives by the local people and avoid providing assistance which will potentially destroy the local economy and leaving the people poor and worse off.
- Develop timely and efficient disaster recovery and reconstruction strategies.

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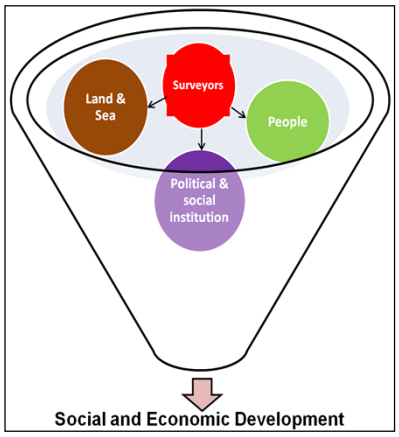
HOW CAN SURVEYORS HELP?

- **Disaster risk management**
- **Geo-reference spatial data**
- **Interdisciplinary knowledge and technical skills**
- **Professionally connected with the key areas of the problem**



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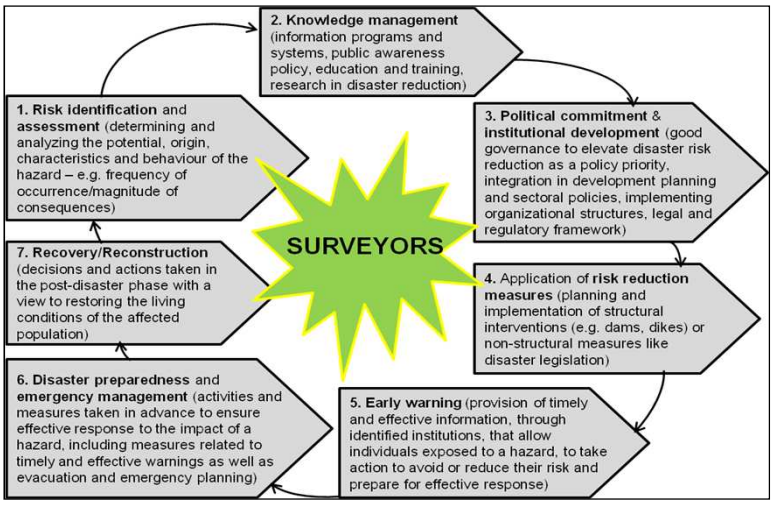
HOW CAN SURVEYORS HELP?



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CONCLUSIONS

- Extreme impacts of climate change are causing large scale environmental disasters in many nations and territories of the world make some peoples refugees
- Sadly, climate refugees have no accepted protection in international refugee law, because the proponents of the 1951 United Nations convention of refugees thought environmental conditions do not constitute a basis for international protection at that time
- Already countries and global organisations are already overwhelmed by the demands of the 1951 conventionally-recognised refugees
- Doing nothing about the looming climate refugees' problem, which could potentially cause global humanitarian disaster, is not the best option. We must engage with the challenge!!

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CONCLUSIONS

- Without international protection and implementation of sustainable adaptation policies, climate refugees could cause global humanitarian crisis by 2050.
- Professionally, surveyors have the knowledge, experience, resources and the technical skills required for adapting to the impacts of climate change
- These professional connections places surveyors at a very important position to advocate and to lead the agenda to protect and accommodate present and future victims of climate induced disasters, particularly, those living in vulnerable communities, which we are already aware, are being displaced or losing their livelihood and could eventually become climate refugees.
- This agenda could be pursued by local surveying institutions at the national level and FIG at the international level

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Thank you