

PointShare.org: a Knowledge Sharing Portal on Land Administration for Climate and Disaster Risk Management

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Key words: Land administration, climate change adaption, disaster risk management, knowledge sharing, point cloud

SUMMARY

Between 2011 and 2014 a joint FAO and FIG Project undertaken by Working Group 2 of Commission 7 developed e-learning training material on addressing land issues in Disaster Risk Management for land professionals. This involved two face-to-face training sessions in Fiji and the Caribbean, several papers were commissioned on specific aspects of land administration and Disaster Risk Management leading to a thematic edition of the Land Tenure Journal, regional case studies were developed, and many papers on the topic were presented at FIG Conferences. In 2014 the work of the FIG Taskforce on Climate Change resulted in FIG Publication 65 on the Surveyor's Role in Monitoring, Mitigating, and Adapting to Climate Change. Also in 2014 FAO released its E-learning curriculum Module on "Addressing tenure issues in the context of natural disasters". This represents a considerable collection of training materials that may be used by land professionals.

The next stage of the work by working group 7.2 of commission 7 included the development of these resources into a knowledge sharing portal that house all key literature in one place and at the same time allow sharing key information, including imagery and point cloud databases. This paper outlines the work done so far and provides an outline of the website and material and the datasets included on it. It is expected this website would improve national capabilities to improve disaster management response globally.

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1. BACKGROUND

As urbanization increases the number and density of urban people exposed to natural disasters has increased. The impacts of natural disasters such as hurricanes, floods, earthquakes and tsunamis have been increasing steadily since the 1950's, particularly for developing countries. According to a World Bank external evaluation report "natural disasters destroyed US\$652 billion in property worldwide in the 1990s alone – an amount 15 times higher in real terms compared to the 1950s. Approximately 2.6 billion people were affected by natural disasters over the past ten years, compared to 1.6 billion in the previous decade. Developing countries have borne the brunt of these catastrophes, accounting for over 95 percent of all casualties" (IEG, 2006). Asia has been the most affected region with 79 per cent of deaths from natural disasters during the period 2000-2007¹; while *Small Island Developing States* (SIDS) are among the most vulnerable. This trend is not likely to change. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2007) has confirmed that frequency and intensity of extreme weather events such as heat waves, tropical cyclones, floods and droughts are likely to increase with climate change (FAO/FIG, 2011).

An increased frequency and severity of natural hazards and natural disasters also has a negative impact on legitimate rights to land. After a disaster people (often the poor and vulnerable) can be deprived of their land or access to natural resources. At the same time, the level of tenure security can have an impact on how land and other natural resources are affected by a natural disaster, the response of the tenure rights holders and their ability to recover from the disaster. These highlight the important role land professionals can play in disaster management through improving the governance of land, and in particular effective land use planning and recording and recognizing ALL legitimate rights to land. Land administration assists prior to a disaster through promoting the importance of land tenure systems to mitigate the impact and facilitate disaster management and resettlement, and secondly, after the event, by supporting a tenure-aware resettlement and reconstruction process (FAO, 2014).

International and development agencies working with disaster risk management have confirmed the importance of security of tenure and access to land for the long-term reconstruction of communities' livelihoods. Building resilience in communities' involves recognising, recording and recognising legitimate property rights to land that exist prior to a disaster, which will lay a solid basis for reconstruction, physical planning, compensation and economic growth (FAO/FIG, 2011).

¹ Centre for Research on the Epidemiology on Disasters (CRED), *2008 Disasters in Numbers*. Department of Public Health, Université catholique de Louvain, Belgium; and ISDR: Brussels.

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Since 2005 the discussion on land tenure issues that arise following natural disasters and the importance of secure land tenure for DRM has been growing. Universities, UN Agencies and some NGOs have been discussing the topic (FAO/FIG, 2011). However, the challenges in addressing land issues for government, civil society and communities are great.

In 2007, as a result of a coordinated effort of the UN Inter-Agency Standing Committee (IASC)², FAO, UN-HABITAT and the IASC Early Recovery Cluster have produced several publications on methodologies, approaches and lessons learned to deal with land tenure and natural disasters: Land and Natural Disasters. Guidelines for practitioners published by UN-HABITAT in 2010³, a holistic framework to address land issues, from the aftermaths of a natural disaster through the early recovery and reconstruction phases; "On Solid Ground"⁴, six national briefs dealing with natural disasters occurred in the past 10 years and the land tenure lessons learned in each concerning country, published by FAO in 2010.

During the term 2011 to 2014 David Mitchell and Jaap Zevenbergen were co-chairs of the FIG Commission 7 Working Group 7.2 "Land Administration, Natural Disasters and Climate Change". This working group sought to provide information for the surveying community on how effective land administration and responsible governance of tenure could support CCA and DRM. The focus was on disaster preparedness and mitigation, and on climate change adaptation. The intended outcomes were:

- Information for land professionals via FIG website and other platforms when appropriate.
- Online training material on land tenure and natural disasters for land and related professionals with a link to Commission 2 for e-learning aspects (FIG, 2011).

These aims came from an understanding that (i) addressing land issues in DRM and CCA is complex and an important focus for land administration and management, and (ii) more specific information was needed on how land administration and land management can contribute to DRM and CCA.

The Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (the Voluntary Guidelines), provide, among other issues, guidance on improving tenure governance and strengthening tenure security of vulnerable people in line with the DRM framework (FAO, 2014). In recognition of the importance of the VGGTs to addressing land issues in CCA and DRM, and to meet the objectives of Working Group 7.2, a joint FAO and FIG project commenced in 2011.

The objective of this FAO-FIG collaboration was to develop e-learning training material on natural disasters, land tenure and administration which can both raise awareness on various aspects of land

² The IASC is the main mechanism for inter-agency coordination for humanitarian assistance. It is formed by 9 full member UN Agencies and 9 standing invitee international agencies working on emergency operations and human rights.

³ UN-HABITAT, FAO, IASC Early Recovery Cluster, Global Tools Network. Land and Natural Disasters. Guidance for Practitioners. UN-HABITAT, Geneva, June 2010

⁴ FAO, UN-HABITAT, IASC Early Recovery Cluster, Global Tools Network. On Solid Ground. FAO, Rome, March, 2010. Re-printing, January 2011.

tenure issues after natural disasters as well as train on the way such issues may be addressed during the Disaster Risk Management (DRM) cycle. The intended audience was both land tenure professionals that deal with natural disasters, as well as to natural disasters professionals that need to include land tenure issues into their DRM work (FAO/FIG, 2011). The outputs of this collaboration are discussed in the following sections and included - two face-to-face training sessions in Fiji and the Caribbean, several papers were commissioned on specific aspects of land administration and Disaster Risk Management leading to a thematic edition of the Land Tenure Journal, regional case studies were developed, and many papers on the topic were presented at FIG Conferences. In 2014 the work of the FIG Taskforce on Climate Change resulted in FIG Publication 65 on the Surveyor's Role in Monitoring, Mitigating, and Adapting to Climate Change. Also in 2014 FAO released its E-learning curriculum Module on "Addressing tenure issues in the context of natural disasters". This represents a considerable collection of training materials that may be used by land professionals.

2. PHASE 1: DEVELOPMENT OF LEARNING MATERIALS 2011-2014

2.1 FAO Publications on addressing tenure issues in the context of natural disasters

During late 2010 and 2011 FAO produced two publications of particular relevance:

1. “*Land tenure and natural disasters: Addressing Land Tenure in Countries Prone to Natural Disasters*” (FAO, 2010). This was an in-depth analysis of land tenure issues in the framework of natural disasters policies and programmes in four countries: Mozambique, Bangladesh, Philippines and Ecuador, and
2. A training manual : FAO Land Tenure Manual No.3, “*Assessing and Responding to Land Tenure Issues in Disaster Risk Management*” (Mitchell, 2011).

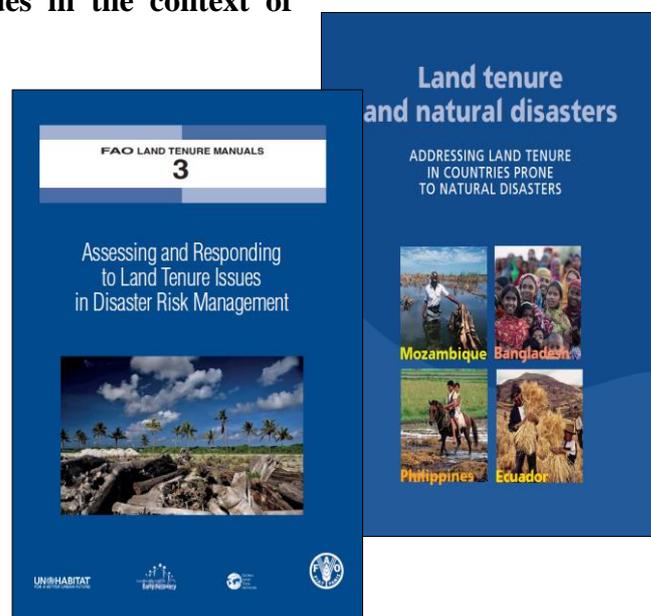


Figure 1 FAO publications in 2011 on land tenure and natural disasters

2.2 FAO E-Learning curriculum: Addressing tenure issues in the context of natural disasters

During 2014 FAO launched the early modules of their E-learning curriculum on "The Responsible Governance of Tenure - E-learning to support the implementation of the Voluntary Guidelines on Responsible Governance of Tenure of Land, Fisheries and Forests, in the context of National Food

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Security” (FAO, 2016). The curriculum includes easy to understand training material as a series of e-learning courses (Modules) that:

- aim to create awareness about the importance of responsible governance of tenure;
- help to improve the capacity of various groups to implement the Guidelines in their countries;
- use a range of instructional methods, including storytelling, case-based scenarios, interactive tests and exercises
- provide additional online resources and links to additional reading (FAO, 2016).

Of significance to Working Group 7.2, in 2014 FAO released its E-learning curriculum Module on "Addressing tenure issues in the context of natural disasters". Several members of the FIG Commission 7 community were involved in writing this module.

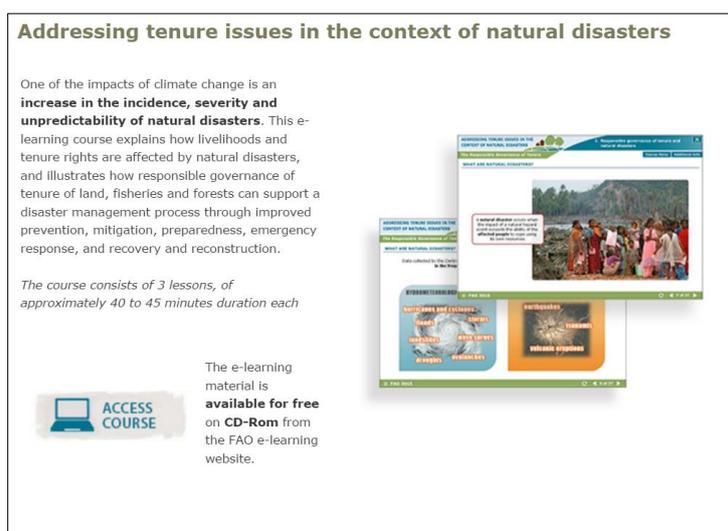


Figure 2 http://www.fao.org/nr/tenure/e-learning/en/?no_cache=1

2.3 Special Edition of the Land Tenure Journal

“This thematic issue on land tenure and disaster risk management (DRM) stems from the recent work done at FAO on normative aspects of land tenure governance that address natural disasters through the DRM framework. In particular, it reflects work undertaken by FAO in partnership with Commission 7, Cadastre and Land Management, of the International Federation of Surveyors (FIG). We are delighted to take this opportunity to acknowledge this important co-operation” (Paul Munro-Faure and Daniel Roberge, Preface to thematic issue).

To raise awareness and share experiences about land tenure and DRM, FIG Commission 7 experts prepared peer-reviewed papers that were published in a special thematic issue of the *Land Tenure*

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Journal. These included three articles that address aspects of spatial information, land valuation and land-use planning in the context of DRM. Also included were articles on experiences with natural disaster events and suggestions for addressing tenure security issues to improve resilience to natural disasters in two of the most disaster-prone regions of the world - the Pacific Islands and the Caribbean.

Papers include:

1. Zevenbergen, J., Kerle, N., and Tuladhar, A., *Spatial information for addressing and assessing land issues in disaster risk management*.
2. Mitchell, D., Myers, M., and Grant, D., *Land valuation: a key tool for disaster risk management*.
3. Roy, F., and Ferland, Y., *Land use planning for disaster risk management*.
4. Mitchell, D., Jacot des Combes, H., Myers, M., and McEvoy, D., *Addressing land issues in disaster risk management in the Pacific island countries*.
5. Griffith-Charles, C., Spence, B., Bynoe, P., Roberts D., and Wilson, L., *Land tenure and natural disaster management in the Caribbean*.



Figure 3 Special Edition of the Land Tenure Journal (<http://www.fao.org/3/a-i4712t.pdf>)

2.4 FIG Publication 65

In 2011, following a series of earlier reports, the FIG formally established a Climate Change Task Force. The primary output of the Taskforce was FIG Publication 65 on the Surveyor's Role in Monitoring, Mitigating, and Adapting to Climate Change. This publication outlines many ways that surveyors can partner with global and regional organisations, and States, in confronting and responding to the climate change challenge (FIG, 2014). Of relevance to the activities of Commission 7 are the sections on mitigating and adapting to climate change, climate change governance, land administration systems, spatial information management, and land-use planning.

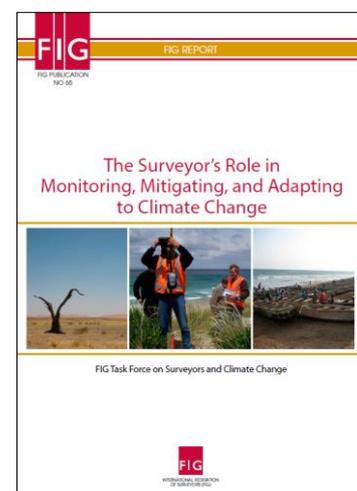


Figure 4 FIG Publication 65: Surveyor's Role in Monitoring, Mitigating, and Adapting to Climate Change

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3. PHASE 2 – DEVELOPMENT OF A KNOWLEDGE MANAGEMENT PORTAL

3.1 Working Group 7.2 – Land Management in Climate Change and Pre- and Post-Disaster Areas

The new Chair of Working Group 7.2 for the 2015-2018 term is Daniel Paez. The aims for Working Group 7.2 during this term are to build upon the work in Phase 1 and establish links to the networks of professionals from land administration institutes and organizations and international and national bodies who are in charge of disaster management. The objective is to raise awareness about the need of appropriate documentation of land rights in disaster situations and to facilitate co-operation with the relevant institutions in terms of securing rights of land owners in areas of high risks (e.a. with SIDS Small Islands Developing States and others).

The working group is also interested in supporting the development of better land information systems that reduce risk, optimize resources during response activities and help reconstruction efforts after a disaster has occurred. In this, it is proposed the incorporation of new data collection technologies, such as drones, as a core element of better land management for disaster response.

3.2 Rationale for a knowledge management portal

Many countries share similar challenges and barriers to improved land governance and land administration. Therefore, the need for information sharing between major stakeholders in the land sector is well understood. In FIG and other land sector forums, many stakeholders express the desire for information on good practices in other jurisdictions, and across sectors. This includes land agencies, civil society, academia, the private sector and the community among other stakeholders.

The question therefore may be – in what form should this information be provided? During our work through the period 2011-2014 and beyond we have had strong input that a key part of sharing of good experiences and projects (knowledge sharing) should be through an Internet-based portal. In 2014, the previous chairs and the current chair of Working Group 7.2 discussed this issue and decided that there was a need for a central portal that could accommodate both dynamic and static data. Static data includes publications that are not intended to be regularly updated (e.g. reports, conference papers, journal papers, etc). Dynamic data includes information that is current and relevant now, but that might not be relevant later (e.g. news items, event information, etc).

The decision was made to develop a website that contains the most significant publications (static) which will be updated periodically, and a Blog (dynamic) that can accommodate frequent updates and the latest news and developments. This paper outlines the work done so far and provides an outline of the draft website and material.

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3.3 Pointshare: Development of the Website

PointShare.org is an online platform created by the FIG commission 7.2, in association with the Universidad de los Andes. It combines social media and online mapping in a blog-style website. PointShare is currently being used as a point-of-contact for practitioners and researchers to share key documents relevant to disaster management and to develop important guidelines, including those for the use of new technologies in disaster management.

This platform requests to provide an information service to the community in just one place: Some of the information services implemented are publications, interactive web blogs and the ability to access a database with point clouds and ortho - photos from different places. This type of SDI is fundamental for developing overarching guidelines and policies that are practical and applicable worldwide.

Inside the website there are papers and general information; in a specific way, recent research and publications (which may be regional, global or thematic) discuss topics related with the climate change adaptation, land management, disaster risk management and natural disasters. Also, with the objective of keeping the website with interactive material, PointShare has a blog where you can share information, asking questions, suggestions or just comments on the issues raised in recognition of the importance of social networks as a necessary component for sharing information.

In addition to publications and discussion forums, the main idea of PointShare is to share and download files of interest including images (eg. Ortho -photos), point cloud (eg. Models - digital elevation), vectors, raster, videos and documents for free. It is a very useful tool, because the access to this data of high-precision equipment is expensive and the information turns out to be very difficult to reach and therefore limit on budget investigations are required. The objective in PointShare is to expand the information resources by collecting data and sharing for the development of technologies for the management of land in climate change and disaster risk areas.

On the right side of the page you can find a banner divided into 5 sections with links to other applications on the page. The first link "conferences" reports with a picture and description some of the conference along with the date and the name of the speaker. The second link is a calendar showing the dates of the upcoming conferences. The third link corresponds to a gallery containing up point cloud photographs, taken by a drone and Lidar laser scanner in different parts of the city of Bogotá, there are also photographs of the drones used and other examples of what they can achieve these expensive tools. The fourth link exposes news of interest. Finally, the last section of this panel shows the last comments made in PointShare, these comments require a name and email along with the corresponding message, however, the page specified that your mail will not be published.

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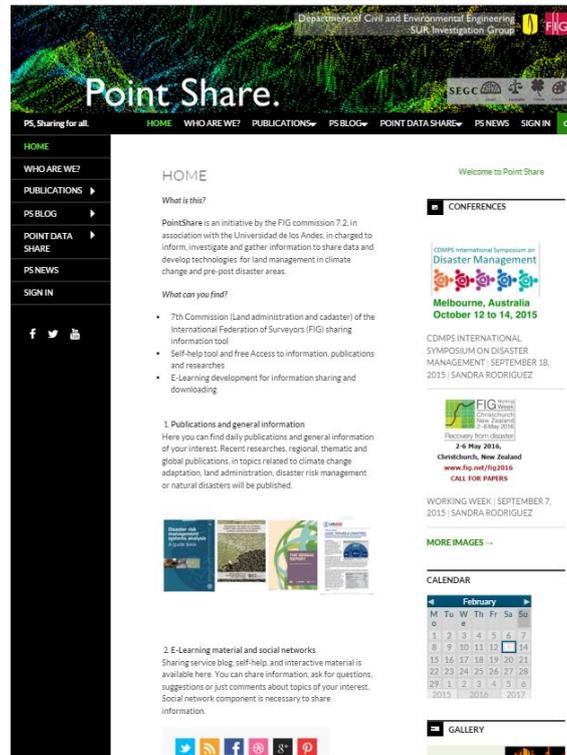


Figure 5. Pointshare.org interface.

Additionally, the page is divided into a total of 7 tabs: "home", "who are we?", "ps Publications", "ps blogs", "point data share", "news" and "sign in"

The first one "home", explains succinctly what the PointShare website is, defining their objectives.

The second "Who are we? " After showing the members who created the page, in this section is exposed the specific goal through a work plan that is, in short, using this tool to establish links with the networks of other professional institutes, international and national organizations, to streamline disaster management recognizing the importance of proper documentation, to facilitate cooperation with relevant institutions to ensure the development of guidelines and general policies that apply Worldwide. The main actors in the page based in representatives are the Professor of the Andes University, Daniel Páez (PhD) and Professor Jaap Zevenbergen (PhD) of University of Twente, and Associate Professor David Mitchell (PhD) of RMIT University.

The third refers to " Publications " this tab is where you will find documents published by several authors, however this tab is divided into two sections in favor of facilitating the efficiency at the time of searching for information, the divisions separating the two issues more relevant within the objectives of the page, " climate change adaptation and mitigation " and " disaster risk management " these publications were made by experts and under the title of each post there is a brief summary of the specific issue of the publication.

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The fourth tab called "Ps blog", like the tab of publication is divided into 2, the same two central themes of the whole website. You must select one of the topics and automatically directed to the appropriate blog, there as already mentioned above are open to discussion, and interactive questions to all users for free.

The fifth tab is " PS news" and is the place on the page where you will find published with the date and place of occurrence news, this news is published in order to keep updated users PointShare about issues interest thereof.

The sixth "sign in" provides links to 5 of the most active social networks nowadays: Facebook, Twitter, Gmail, Blogger and YouTube, associated with the respective account PointShare.

The seventh tab "Point Data Share", you can start using the GXP Xplorer designed by BAE Systems, which is a geographic tool planned to share, download, edit and storage all types of images, videos and point clouds related to mapping developing and innovating geographic information all around the globe.

GXP Xplorer, it is a data management application, this makes it easy to locate, retrieve and share geospatial data anywhere in the world. It also has an additional tool called GXP Web view, which allows measurements, locate coordinates and locate desired information, modifying the original file later to be published in PowerPoint JPG, PNG y KMZ.

Data can be searched temporally, spatially, and by textual attributes. Specifically, by product type, keywords, geospatial areas, product attributes, time and data range. The seeking can be displayed on a map using geographic coordinates, making easier to identify and locate them. In addition, it can read and classify multiple file formats depending on the file extension.

Respecting the interface is very friendly with the user, it has 3 main tabs. The first tab, Map page, find the desired information placing it in the terrestrial map made by generating a visual reference of the data sought. All information has associated metadata.

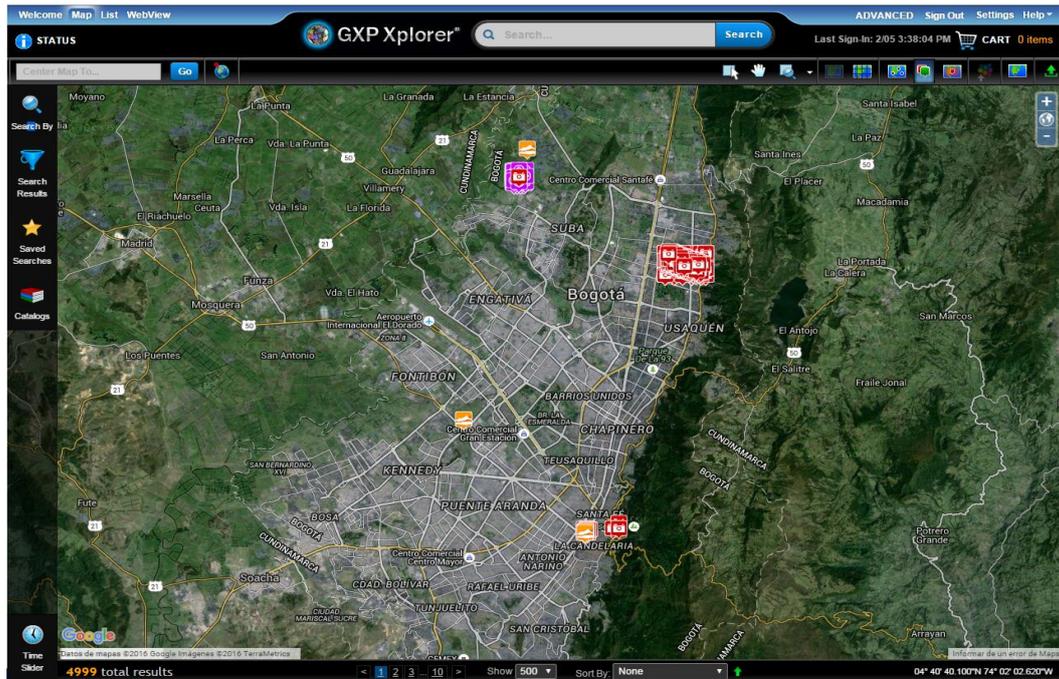


Figure 6. Map page GXP Xplorer

The second tab, list page, generates a list of desired items, which can be classified by file type. Also allows the display of the image and the metadata associated with the search.

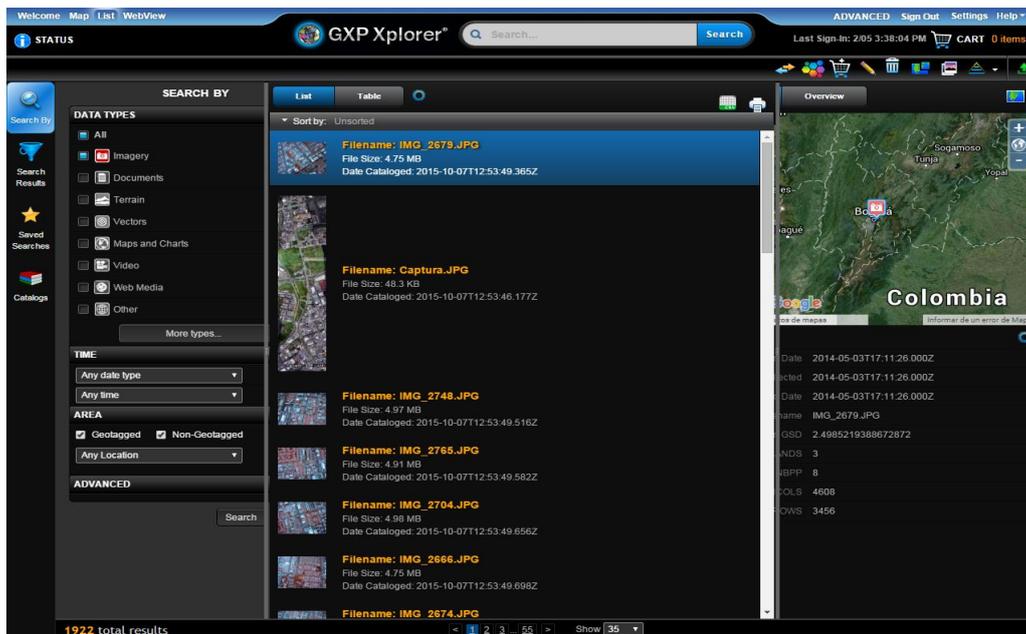


Figure 7. GXP List page

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The third, Web View, Displays in full resolution the selected imagery in a separate browser window. In this one, you can find the tools listed below, which can generate measurements, annotations, modifications and finally publish them in the desired format.



Figure 8. GXP Web view Tools



Figure 9. GXP Web view page

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PointShare, allows sharing knowledge and data, saving time and costs. It is a handy tool that generates less time searching for information, finding in one place, publications, topics of interest and exchange of information from a reliable and safe source. This spatial data infrastructure enables close collaboration between professional practitioners and academia, being of vital importance to develop from a platform large studies and analyzes to identify features and data worldwide.

A basis concept for PointShare is its policy for data sharing in where free non-commercial use of all information is established to all information upload to the website.

4. NEXT STEPS

The next stage of the work of Working Group 2 aims to improve the resources in the knowledge sharing portal that will house all the key literature in one place. This will involve the enhancement of the website to house or provide links to the most significant publications, complemented with a blog that can provide updates and latest news.

Additionally, is important to seek more participation of practitioners, researchers and students, to develop a dynamic website as an important tool to support information and technologies for land management in climate change and pre-post disaster areas.

5. CONCLUSION

Nowadays, analyze the impacts of climate change on land management and land use is an important issue to raise awareness of the need for proper documentation of land rights in disaster situations. Furthermore, the cooperation with relevant institutions is required to ensure the rights of landowners in high-risk areas.

Support the development of better information systems on land that reduce risk and optimize resources for response activities, it is an important way to inform people and encourage the study of these issues, therefore develop a Spatial data infrastructure (SDI) is an important tool to help people interacting with information and to provide them an easy access resource.

PointShare is a website charged to inform, investigate and gather information to share data and develop technologies for land management in climate change and pre-post disaster areas. It is a self-help tool with free access to information, publications and researches, designed to minimize time spent searching for data and support collaboration between academia and professional practitioners.

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BIOGRAPHICAL NOTES

Daniel Páez is a Civil engineer from the Universidad de Los Andes with a specialization in GIS and a PhD in Engineering from the University of Melbourne (Australia), with over 12 years' experience in transportation planning, research and academic teaching, project evaluation and development of public policies. Daniel Paez is currently a professor at the Universidad de los Andes, where he teaches courses in transport and geomatics.

David Mitchell is an Associate Professor at RMIT, a licensed cadastral surveyor, and has a PhD in land administration. David is co-chair of the GLTN Research and Training Cluster, and member of the GLTN International Advisory Board. At RMIT University he teaches cadastral surveying and land development and undertakes research focusing on the development of effective land policy and land administration tools to support tenure security, improved access to land and pro-poor rural development. He also has a strong research focus on land tenure, climate change and natural disasters. He was a co-chair of Commission 7 Working Group 2 for the period 2011-2014.

Jaap Zevenbergen is professor in land administration systems at the University of Twente, Faculty of Geo-Information Science and Earth Observation (ITC), department of Urban and Region Planning and Geoinformation Management in Enschede - The Netherlands. He holds Master degrees in geodetic engineering and law and defended his PhD on systems of land

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registration in 2002. He has published several articles and numerous papers about land administration and land registration. He has studied numerous systems of land registration, both as a researcher and as a consultant, the most recent being Ghana and Uganda. He was also co-chair of Commission 7 Working Group 2 for the period 2011-2014.

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