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Satellite data based semi-real time media contents to promote public awareness of natural disasters

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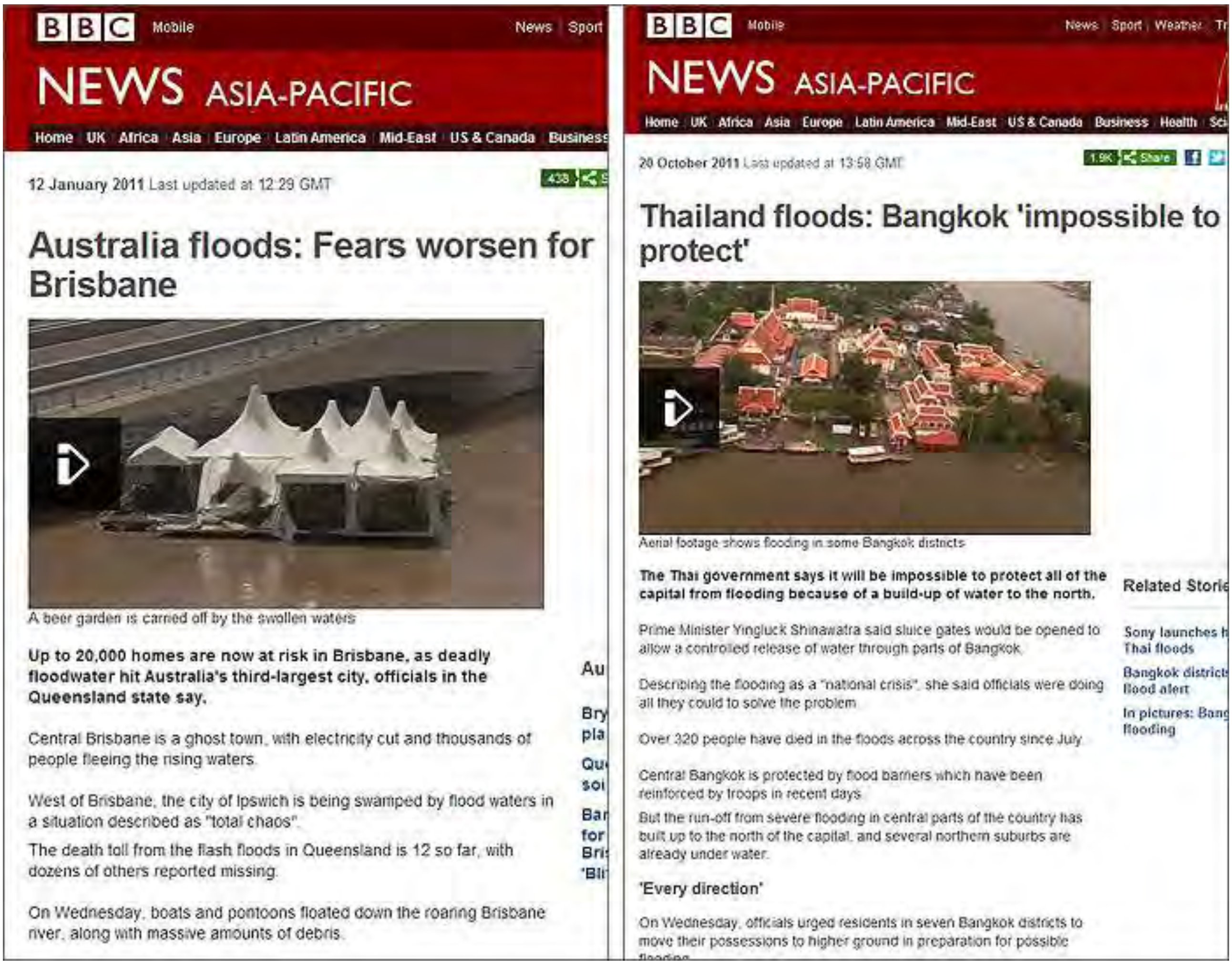
Abstract:
Natural disaster mitigation is a collective effort of; forecast, assessment, and encouraging the public participation in disaster mitigation. This study focused on the rarely addressed aspect, “the value of public awareness” on natural disasters. The promotion of public awareness can be linked to the better public participation in disaster mitigation efforts. This study used satellite data and Geographic Information Systems (GIS) to produce semi-real-time “Media-GIS” contents to widen the public awarness. The methodology to produce Media-GIS contents is based on; fundamentals of GIS, satellite images, and data extracted from Google Earth. Hence contents carry inherent characters of GIS and different from conventional graphics use in media. Also the graphical variables like, *size, value, texture, hue, orientation, and shape*, were optimized to match with target content users (age group, social group) and medium (print, TV, WEB, mobile), while minimizing the *cost*. With the brake of the disaster news, MODIS (250m) satellite data can be extracted in GeoTIFF and KLM (Keyhole Markup Language) formats. The KML file was overlayed on Google Earth, to extract spatial information of the disaster site. Then, in ArcGIS environment, GeoTIFF file was transferred into Photoshop for production of the graphical image map content. This Photoshop content can be used independently or as a new KML file in ArcGIS. The resulted KLM file will be the GIS media content for TV, WEB, mobile, or for print media. When public get these location based semi-real time information of the disaster, they start to pay a greater attention due to various links they have to the respective disaster hit region or similarities of own region and disaster hit region. This situation will support to increase the public awareness of the disaster, and indirectly help to attract more public support in disaster mitigation programs. Two cases studies; Brisbane flood disaster occurred in early 2011 and the on-going disastrous flood in Bangkok, are presented in the study.

1. Introduction

In modern world “Media” in all mediums are having a tremendous impact on every aspect of our daily life. While it is a massive business, media plays as the prime controlling tool in all forms of propaganda to address general mass. Media (the plural of "medium") is a truncation of the term "media of communication," referring to dissemination of facts, opinions, entertainments, and other information, through newspapers, magazines, outdoor advertising, film, radio, television, the World Wide Web (WWW), books, CDs, DVDs, videocassettes, computer games, and other forms of publishing (newworldencyclopedia, 2008). With the arrival of electronic media, digital printing, and WWW, a constant demand pushed to invent innovative developments in content production of media. In this background, reports related to natural disasters are playing a prominent field in media topics, since disasters are directly related to people, economy, and natural environment. The victims of earthquakes, hurricanes and tsunamis are perceived as 100% blameless and get a bigger sympathy from the content viewer, while the victims of wars do not enjoy such absolute status (Stroehlein A., 2010). The requirement of high speed relief assistances, immediate damage assessments, and disaster mitigation efforts have a relation with media contents on the respective disasters. This is due to the high impact of media contents on the public in the modern society. However, the lack of location based fresh information and maps in these media reports make a significant limitation in contents. Two WEB based news report samples from 2011 Queensland and Thailand flood disasters are presented in figure 1. This study examined a large amount of disaster news articles in web and found nearly all these reports are mainly carry local photos, few maps, but very rarely carry semi-real-time information acquired from satellites.


BBC Mobile News Sport

NEWS ASIA-PACIFIC

Home UK Africa Asia Europe Latin America Mid-East US & Canada Business

12 January 2011 Last updated at 12:29 GMT

Australia floods: Fears worsen for Brisbane

A beer garden is carried off by the swollen waters

Up to 20,000 homes are now at risk in Brisbane, as deadly floodwater hit Australia's third-largest city, officials in the Queensland state say.

Central Brisbane is a ghost town, with electricity cut and thousands of people fleeing the rising waters.

West of Brisbane, the city of Ipswich is being swamped by flood waters in a situation described as "total chaos".

The death toll from the flash floods in Queensland is 12 so far, with dozens of others reported missing.

On Wednesday, boats and pontoons floated down the roaring Brisbane river, along with massive amounts of debris.

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NEWS ASIA-PACIFIC

Home UK Africa Asia Europe Latin America Mid-East US & Canada Business Health

20 October 2011 Last updated at 13:58 GMT

Thailand floods: Bangkok 'impossible to protect'

Aerial footage shows flooding in some Bangkok districts

The Thai government says it will be impossible to protect all of the capital from flooding because of a build-up of water to the north.

Prime Minister Yingluck Shinawatra said sluice gates would be opened to allow a controlled release of water through parts of Bangkok.

Describing the flooding as a "national crisis", she said officials were doing all they could to solve the problem.

Over 320 people have died in the floods across the country since July.

Central Bangkok is protected by flood barriers which have been reinforced by troops in recent days.

But the run-off from severe flooding in central parts of the country has built up to the north of the capital, and several northern suburbs are already under water.

'Every direction'

On Wednesday, officials urged residents in seven Bangkok districts to move their possessions to higher ground in preparation for possible

Related Stories

Figure 1. Two typical samples of disaster news articles in WEB posted by one of the top rank news companies (source: BBC news), but with no support from freely available satellite images.

These news items are travelling around the world through WWW and other electronic and print media, where people even don't have proper understanding of the relative location of the disaster. When news travels around the world at lightning speed using satellite communication systems, it's beneficial for readers to have information on location and any semi-real-time pictorial information of the disaster. The application of satellite images, especially semi-real-time satellite images can be a very effective addition for reporting of most of the natural disasters (USGS, 2011; Altan at el, 2010; Nakya et al, 2007, Perera & Pathirana, 2006). The use of the term "semi-real-time" in this report represents the time factor related to real-time satellite images and processing and production time of the disaster content based of the particular satellite image. With regard to natural disasters, this time factor should not exceed the arrival of satellite to take same image frame again.

GIS (Geographic information systems) can be successfully used to build a link between disaster news and location based semi-real-time information derived from satellite images. GIS uses a computer-based process to collection or capture, maintain, store, analysis, and distribute spatial data and associate attributes (Nationmaster.com 2010). In application, GIS is widely used in scientific investigations, resource management, and development planning. For example, a GIS program might be allowed emergency planners to calculate emergency response time in a natural disaster, or find wetlands that need protection from pollution (USGS Geography Publications, 2008). The present study firstly focuses on basic level GIS application for media contents, in order to promote a new sub-division of GIS, "media-GIS". Secondly, the study discusses the link between location based semi-real time media contents and value of these contents to promote public awareness on natural disasters. El-Masri and Tipple (2010) emphasized the value of development of a better understanding of the interaction between human and natural systems and their environmental and socioeconomic dimensions, with regard to natural disaster mitigation plans. Also, the public participation in government decision making is becoming an important component, in order to achieve a better local level participation in disaster mitigation activities. When the public has a better awareness of natural disasters, mitigation plans can be convinced with better productivity (Weichselgartner, 2001; Jayawardane, 2005; Godschalk, at el, 2010). Pearce in his study discussed the public participation as a key to success of government disaster mitigation plans, using number of studies conducted in Australia and New Zealand (Pearce, L., 2003). These all works clearly indicate the value of public participation in disaster mitigation. Under this contextual, the present study focuses on production of semi-real time location based media content as a tool to promote the said awareness. In the paper, the methodology for production of semi-real-time natural disaster contents is presented using two case studies.

2. Media-GIS and Image Maps

2.1 Media GIS

The power of a GIS comes from its capability to relate different information (data) in a spatial context and to reach a conclusion about relationships among used data layers (USGS Geography Publications, 2008). Any natural disaster contains the character of location reference information, relates to a certain location on the earth. As an example, when a flood disaster hit, it is important to know where the extreme rainfall was recorded, directions of flood flow, and affected infrastructures. In most of the cases, satellite images of flood incidents are fully covered with clouds, however, these could images are showing some level of information about the degree of the rainfall. When the flood is becoming prolonged, it's possible to obtain clearer images to show flood extent, enabling to display first-hand information taken from the space. The level of involvement of these image-based products in the natural disaster contents clearly increases the commercial and information value of the news item. Figure 2 simplified this situation with three cases, i.e., extensive, partial, and non-existence of location based image contents in news.

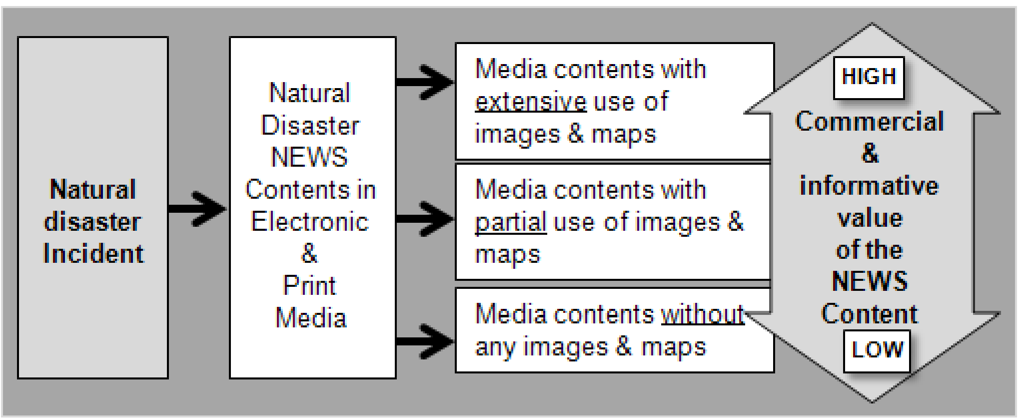

Figure 2. The value of natural disaster content can be upgraded through the use of image maps.

When the spatial character in natural disaster is transferred into GIS database, a new set of application potentials are emerging including contents and possible display portals. The whole range of activities can be labeled as Media-GIS, a sub-division of GIS. As a sub-division of GIS, Media-GIS contains number of basic GIS components as describes in figure 3. If we isolated single media-GIS content, it starts with the brake of natural disaster news. As the concept of production flow presents (figure 3), content maker should search and collect relevant data including archived information, when it is applicable to the incident. Content production and relay it to the customer or viewer through appropriate media platforms ends the process. In order to maximize the commercial and graphic value, this content production process must maintain number of standards which will discuss in section 3.

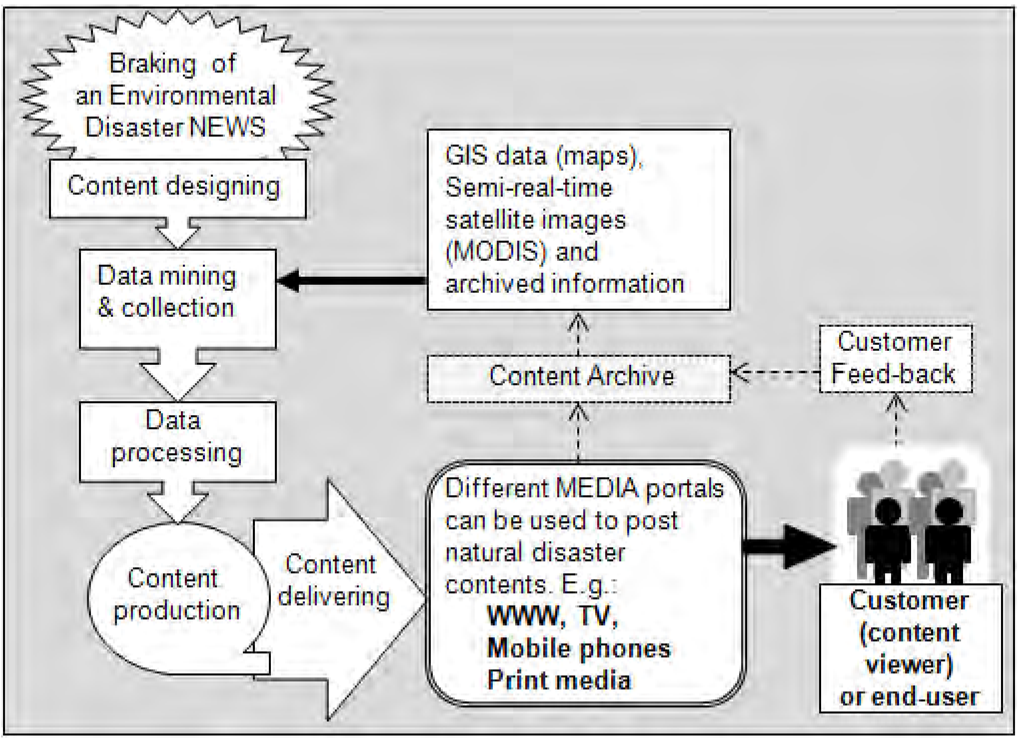

Figure 3. The simplified production flow of media-GIS

2.2. The image maps

Image maps, the primary product in Media-GIS, are geometrically registered satellite images or aerial photographs. They are extensively use in various situations, from private GIS users, academics, to large organizations like NASA to; *present, and explore* land surface information in greater details (Short, 2010; Sultan et al, 2008). Georectified image maps can be included into a GIS system to conduct further analyses or present as a graphic content. Scientific background of production of image maps is coming under spatial data visualization. In spatial data visualization, there are three major objectives, i.e., *data presenting, data analyzing,* and *data exploring* (Kraak, 1999). While a bulk of media-GIS graphic contents use to present information, some of them may analyze the incident or explore related information further. However, optimizing the main graphical variables like, *size, value, texture, hue, orientation,* and *shape*, is vital when the Media-GIS content prepared for the publishing media (print, TV, WEB, mobile) and target market (age group, social group), while minimizing the cost. Especially, size, hue (colour) and shape of the graphic elements are critical for the target media market. Under the case study section, the *presentation* aspect will be visualized with multi-temporal (the GIS component)images maps of two major flood events occurred in 2011.

3. The concept of Media-GIS contents

Media-GIS explains in this report can be considered as a computer-based system that explore, collect, maintain, store, analyze, and distribute, *graphic contents* of *natural disasters and other spatially located significant incidents* to electronic and print media, with a *high esthetic quality.* Media-GIS produces graphic contents or image maps for media with a considerable academic authorization at semi-real-time phase. The ultimate goal of media-GIS should be to enrich the user understanding with spatial information of the incident and increase the awareness of the disaster, while improving the quality of media business. Here, media-GIS content production focuses on five basic qualities or standards (Perera & Tateishi, 2008), i.e.; *accuracy, high esthetic quality, speed, low cost,* and *reusability*. Content maker must have some level of basic knowledge and skills in; GIS, remote sensing data handling, and graphic production, to maintain these standers.

3.1. Accuracy

Since contents are passing firsthand information to general public, the **geographical** and **informative** accuracy of the contents is paramount. For this purpose, it's easy to maintain a substantial accuracy of the product, if the GIS database is registered with proper base map products, which are georectified MODIS image products, the major data source we utilized in this study. Geographical accuracy is very important, when data layers merge and also to use the contents through the archive. However, if the content is paying a bigger attention on informative accuracy, geographic registration may get a lesser importance. When graphics import and export between remote sensing and graphic software packages, producer has to retain the geographic reference in data files (explained further in Table 3).

3.2. High esthetic quality

The use of colors (hue), fonts (size and color), and symbols in media graphics must be carefully selected to meet the technical requirements of the respective media, and target viewers including age groups. Graphics should not hinder the original information in image. Font sizes must be large enough to read easily, and priorities of words on the content must be carefully balanced to maintain the informative and visual quality. For web media, graphics must have smaller file size (JPG/GIF file formats) to maximize the download time. For TV media, full color heavy TIF graphic products can be created, but easy to read and less complicated graphics must be used. The content producer has to study new technological developments, regularly, and tailoring graphics into various media platforms is not discussed in depth here in this paper. Specially, web based data visualization and presenting methods are facing a very radical development always (Friedman V., 2007; Ostrow, A., 2007). All graphic products in original TIF format with all image layers must be systematically archived for future use.

3.3. Production speed

Speed can be maximized at three different levels. The first is *data mining, downloading, and converting* into the GIS database. The second is *graphic production process*, which mainly controls in ArcGIS, Photoshop, and Google Earth environments. Here, graphic skills and experience in Photoshop as well as basic knowledge in other software packages are necessary. Speed of the content production has a direct relation to the commercial success of the product. If the media company is demanding contents without very high geographic accuracy, the content producer has to entertain such requests positively to balance the market/customer requirements. Thirdly, media content itself must have the correct file size (in kilobyte) to enhance the *speed of data mobility* in respective media portal.

3.4. Low cost

Minimizing the overall cost can be linked with the use of freely available of MODIS satellite data. Initial cost for ArcGIS will be a significant limitation, but producer can explore the applicability of functions in any other remote sensing and GIS software package which can be a substitute. Google Earth functions are freely available through internet. Initial cost for Photoshop is relatively low compare to its one time investment; an older CS version is between US$350 to US$650 over the internet. Older versions are cheaper and strong enough to produce excellent graphics.

3.5. Reusability

All media-GIS contents must be systematically archived. Here, final content as well as interim products can be archived by topic, geographic region, and date. Some end-products can be reused without any additional change, to display historic conditions and comparison presentations. A proper archive system of contents and customer feed-back information (see figure 3) will directly lower the overall production cost in long-run.

4. Data and Methodology

4. 1. MODIS data

MODIS (MODerate-resolution Imaging Spectrometer) data became available for scientific to successfully conducted a large number of application studies on earth surface and atmosphere. (Barnes et al., 2003, Friedl et al., 2002; Hall et al., 2003; Zhan et al., 2002). Data products such as MODIS NDVI (MODIS web, 2010; Perera & Tsuchiya, 2009; USGS, 2007) and true color image data (MODIS web, 2012; NASA Rapid Response, 2012; Gumley et al., 2003) are freely available through NASA for researchers. The sensor characteristic and temporal and spectral resolutions of MODIS data are fully documented in MODIS official web site (MODIS web, 2012). Rapid production of graphic contents for media-GIS can be benefitted from these freely available pre-processed NASA's MODIS products. Table 2 summarized important information of MODIS data with respect to Media-GIS content production. The content producer must aware the possible file sizes, depending on the sub-scene and image format, before download data. A large sub scene in tiff format may exceed 80 MB in file size and takes a substantial time to download if the network connection is slow. Figure 4 shows the USDA Foreign Agricultural Service (FAS) sub-scene layout, which covers images used in the case studies of this research. MODIS images are acquiring two times a day (see table 2) and the definition of "*semi-real-time*" is open for discussion. However, MODIS has the capability to show at least some of the widespread disaster incidents within 24 hours of time span.

Table 2. MODIS information useful for media contents (compiled from information available in MODIS sites).

Element	**Information**
Orbit	705 km, 10:30 a.m. descending node (Terra) or 1:30 p.m. ascending node (Aqua), sun- synchronous, near-polar, circular
Swath Dimensions	2330 km (cross track) by 10 km (along track at nadir)
Spatial Resolution	250 m (bands 1-2), 500 m (bands 3-7), 1000 m (bands 8-36)
Available file (image) format	Geo-TIFF, JPG, and KMZ (Keyhole Markup Language Zipped - file format needed for Google Earth overlay).
Available ready to use	• Aerosol Robotic Network (AERONET)

sub-scenes	• USDA Foreign Agricultural Service (FAS) (see figure 4) • Fire Information for Resource Management System (FIRMS), Antarctica, Arctic, Other
Available image products	• MODIS True color image. Band 1 (Red), 4 (Green), 3 (Blue) give natural looking image of the land surface. • Band 7 (Red), 2 (Green), 1 (Blue) combination, shows water in black or dark blue. Water clearly standouts in green vegetation. Enhancing floods. • NDVI image – intends to use in vegetation studies.
Data access	Free through the internet (NASA Rapid Response, 2012.)

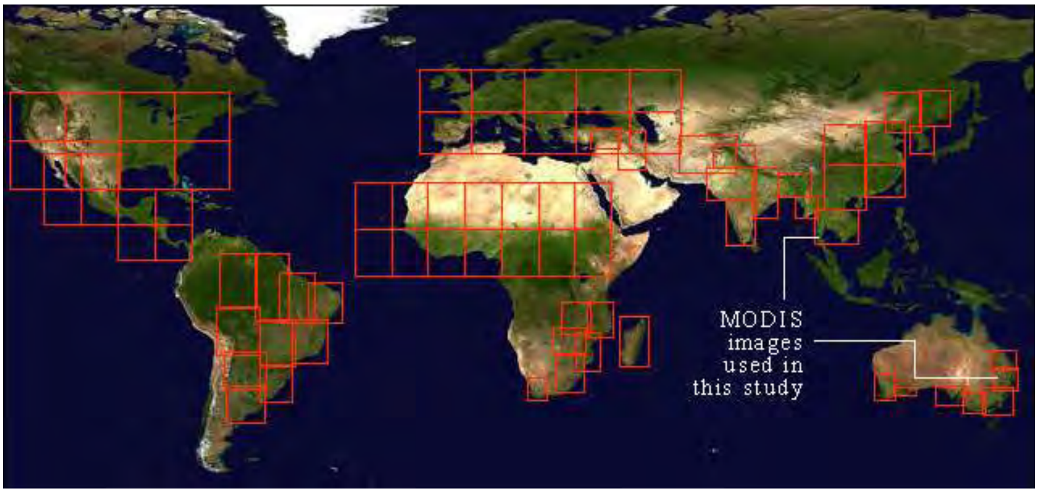

Figure 4. Geometrically and radiometrically corrected MODIS image subsets cover most of the natural disaster-prone areas of the world. The FAS subsets are displayed here. FIRMS, Antarctica, and Arctic subset frames are not included (source: NASA Rapid Response, 2012).

4.2. Methodology and production process

The Methodology is explained is table 3 using different action steps which focused on production process of natural disaster contents based on MODIS images. Here, the process discusses the methods used in case study presented in this study. However, media-GIS graphic contents are not limited to use of MODIS data, and open to any other georectified graphic or map layer as the base data set.

Table 3. Working steps of a media-GIS content.

Step	Element	Action
1	Brake of natural disaster news	NEWS investigation
2	Check the MODIS image availability	Data mining
3	Search historical images if comparison is needed	
4	Search other GIS data files and *local information*	Data collection/generation
5	GeoTIFF and KMZ image sub-scene of the location (file name example; **image.tiff** and **image.kmz**)	Image download
6	Read MODIS GeoTIFF image into ArcGIS and select the Area Of Interest (AIO), or the disaster hit area (**image01.tiff**)	Image reading and clipping
7	Produce the “raster world file”(**image01.tfw**) through; *data management -> raster -> rater properties*	Image processing
8	Produce the KMZ file(**image01.kmz**) for initial data mining using ., **image01.tfw**	Image processing

9	Read GeoTIFF image (**image01.tiff**) into Photoshop	Image exporting
10	Display downloaded KMZ image (**image.kmz)** in Google Earth	Data exploring
11	The Media-GIS graphic content and save with a new file name (**image02.tiff**). The content at this stage is suitable for print media and can be developed into mobile content.	Graphic content production. Use in print media.
12	Import the graphic content into ArcGIS and rename the already produced "raster world file" as the new graphic content TIFF file (e.g. **image02.tfw**)	Image importing, Image processing
13	Register the new content file using "*define projection*" in ArcGIS.	Image processing
14	Produce the new KMZ file, **image02.kmz**	Content display preparation
15	Open the KMZ file in Google earth (which has a poor image quality due to the KMZ file format compress).	Content display preparation
16	Open "image overlay" tool in Google Earth and visually overlap the graphic content **image02.tiff** over **image02.kmz**	Creation of final KMZ file
17	Remove **image02.kmz** from the temporary folder in Google earth.	Creation of final KMZ file
18	Save the final product, or the **image03.kmz** file for use in TV and WEB media. This file can be displayed on Google Earth.	Content presenting. Store graphics in archive.

According to the level of skills in image processing and graphics, the data processing routings to produce media content may be varied from the process listed in Table 3. However, firm registration of data into a GIS database ensures the higher level of spatial accuracy. Media-GIS content images include in this report are the images at **image02.tiff** (step 11 in Table 3) stage of production**.**

5. The case studies

5.1 Data

MODIS images were acquired after investigating the images covering entire disaster period, for both case studies. Table 4 listed the downloaded MODIS products used to produce Media-GIS contents included in this report.

Table 5. Acquired MODIS products for case studies

MODIS file name	
Case Study 1 - Queensland	**Case Study 2 - Bangkok**
Australia6_2010019_aqua_721_250m.tiff	FAS_Indochina_2011189_terra_721_250m.tiff
Australia6_2010019_aqua_721_250m.kmz	FAS_Indochina_2011189_terra_721_250m.kmz
Australia6_2011011_terra_721_250m.tiff	FAS_Indochina_2011268_terra_721_250m.tiff
Australia6_2011015_terra_250m.tiff	FAS_Indochina_2011268_terra_721_250m.tiff
Australia6_2011015_terra_721_250m.tiff	FAS_Indochina_2011307_terra_721_250m.tiff
Australia6_2011015_terra_721_250m.kmz	FAS_Indochina_2011335_terra_721_250m.tiff
	FAS_Indochina_2011307_terra_721_250m.kmz

5.2 Case Study 1 - Queensland floods, 2011

A massive flood has devastated the Southeast region of Queensland and Australia's 3rd largest city, Brisbane in early 2011. The Queensland area recorded averaged rainfall of 121.17 mm, 38.67 mm above the 1961-90 average of 82.5 mm. 66.6% of the state had above average to highest on record rainfall (BOM, 2011). Extremely heavy rains continued for few weeks causing deadly flash floods in Toowoomba, the mountainous city 120km west to Brisbane. The flood then advanced into already saturated soil in Lockyer Valley, between Toowoomba and Brisbane. Accurate flood warnings minimized the human casualties, but the economic damage of the region billed in billions of dollars. According to early damage estimations, $2 billion and $1.2 billion economic losses have recorded in mining and agriculture sector respectively (IBISworld, 2011). This flood disaster has taken as the first case study to produce a MODIS image based GIS-media content.

The objectives of both case studies present in this study were set as optimization of esthetic quality of the content (or the image map) while maximizing the production speed. The content of the case study 1 presents with four images using natural color and band 7-2-1 combinations to show no flood (figure 6, 10th Jan 2010) and flood peak (figure 7 and 8, 15th Jan 2011) conditions. Figure 5, shows the KML formatted final product on Google Earth. The widespread brownish colour turbid water (over 25km wide in some places) in Moreton Bay is a clear indication of the massive scale of the flood (figure 7 and 8). Compare the Moreton Bay or sea next to Brisbane city with no flood image. The Queensland case study mainly focused on TV media with the secondary use targeted WEB, mobile and print media portals. If these graphic contents are to be used in WEB media, any of 640 x 480 they can be saved as JPG file, which only has file size around 50K(at 50% quality), which is a lighter file that can easily handles in present day computers and most of the individual internet connections.

When the public is having a high attention on the disaster news, these semi-real-time satellite image products will clearly increase the viewer's enthusiasm and commercial value of the news program. This is the important factor focused in this study. When the viewer is well informed with firsthand real-time data, public cooperation for disaster mitigation efforts improves positively.

Figure 5. The final product (KML format) on Google Earth.

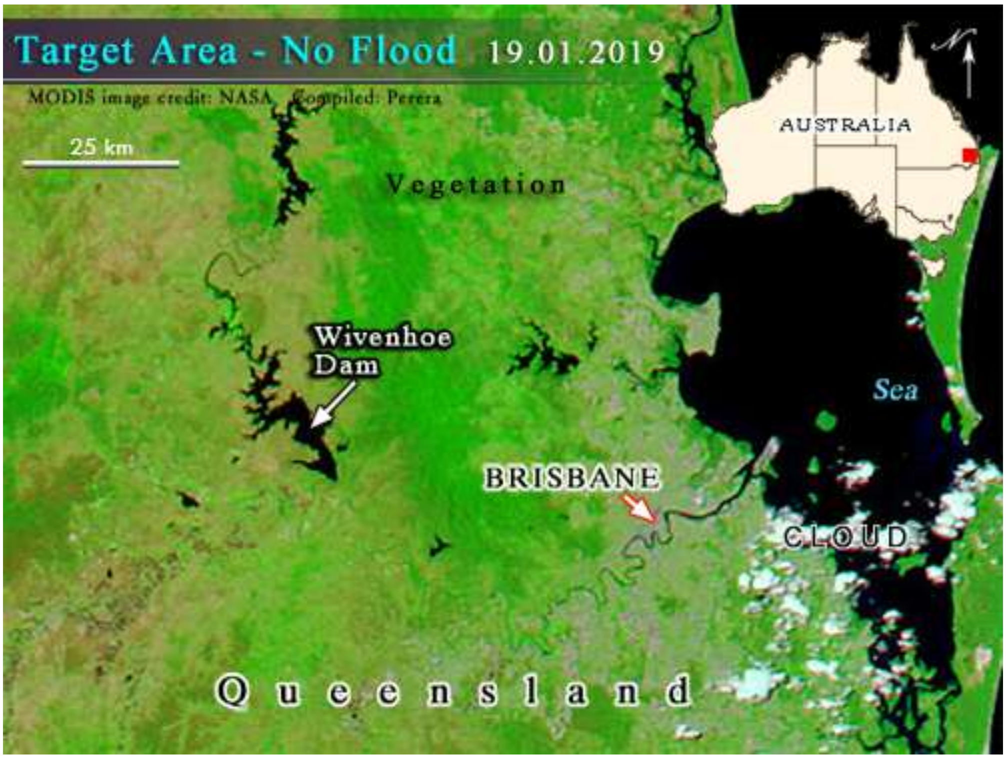

Figure 6. When the news on flood telecast, this no-flood image can be used with all other flood stage contents, to show the status of the flood.

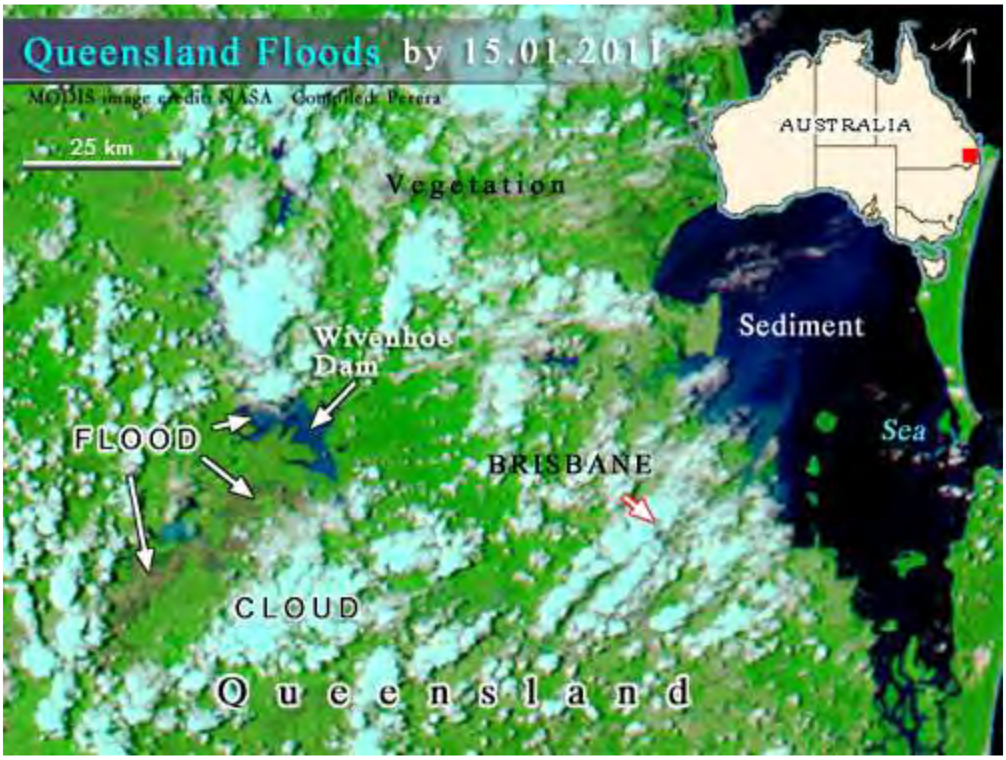

Figure 7. The flood peak. Clouds have partly covered the flooded areas; however, bluish color in sea (Moreton Bay) up to 35 km from the shore indicates the degree of flood. Band 7-2-1 combination used to compare with no-flood image.

Figure 8. The flood peak. This MODIS natural color image shows muddy water clearly, in land and in the (Moreton Bay).

5.3 Case Study 2 - Bangkok floods, 2011

The worst flood in last 50 years hit Bangkok city and vicinity in Thailand during the 2011 monsoon season. Bangkok and surrounding provinces were severely inundated by the long lasted flood. The disaster began around Jul 2011, and continued into Dec 2011 killing over 800 people. More than 13 million people were affected and the World Bank estimated the total damages as 45 billion USD as of Dec, 2011 (World Bank, 2011). The Media-GIS contents were produced for the case study 2 with the no-flood content and three stages of flood detected by MODIS band 7-2-1. Full image scenes were downloaded but only a close-up image portion of Bangkok and some GIS data layers (roads, administration boundaries) are presented here. Similar to the case study 1, all of these image maps can be opened in Google Earth to pinpoint the content in TV news programs or can be individually used in WEB and print media. Figure 9 shows the final KML file on Google Earth, and consecutive figures are presenting no-flood image and three stages of the flood.

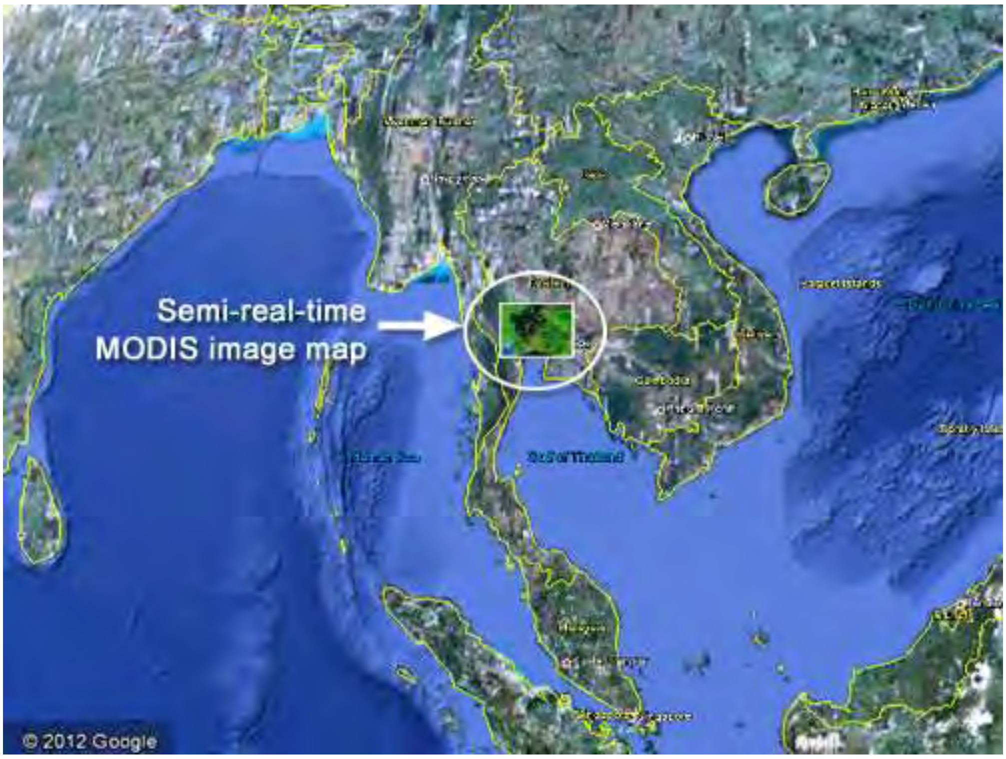

Figure. 9 The final product of case study 2 (in KML format) on Google Earth.

Only a selected image set is presented for the case study 2. With the semi-real-time appearance of these image maps in media, the public can gain a great deal of information on spatial conditions. The increase and decrease of flood extent is clearly standout in MODIS 7-2-1 images. When these contents are on Google Earth, numerous other usages can be generated.

Figure 10. The no-flood condition of the flooded region + some GIS data.

Figure. 11 The early stage of the flood. Black or dark blue flood water appears north and east to Bangkok city.

Figure 12. The flood peak, when most of the areas north to Bangkok city center is inundated.

Figure 13. By Dec 2011, flood started to decrease, however the satellite image shows a large area of northwest Bangkok is under water.

5. 3 Mobile contents

The exact same media content can be re-produced for mobile media with spending very little extra time on production. Other than the concerns discussed in production process, mobile media demands graphic contents with small files size, which should be less than 100k to accommodate various capabilities in mobile phones and broader audience. As Mobile Advertizing Guidelines explains, media contents may use the maximum image size of 320 pixels by 240 pixels which is the recommended size for large MMS (multimedia messaging service) video (Mobile marketing association, 2009). The figure 13 shows the mobile media content reproduced from the figure 11 content into 320 x 240 dimension, and jpg image did not exceed 30k in file size at 50% quality.

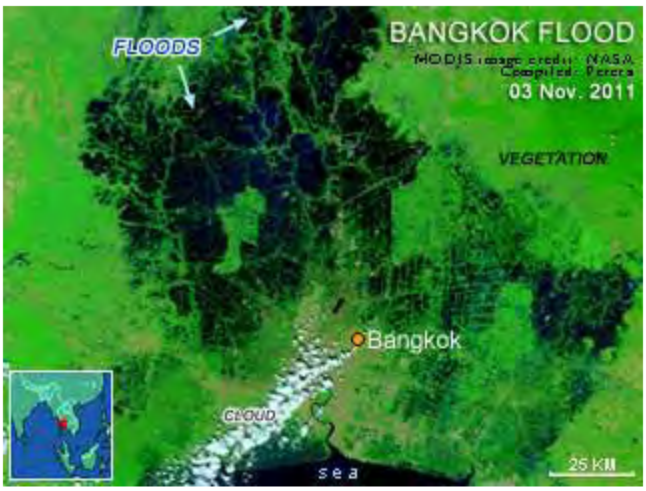

Figure 14. Re-production of the content for mobile media use.

In commercial application, all these environmental disaster media contents can be used to enrich any news presentation and other weather and environment related programs and documents. The case study presented here only focused on production aspects of the media contents; hence, descriptive exploration of facts related to the spill was not discussed in length.

6. Recent trends

Due to the rapidly growing commercial competition, navigation in the Web using innovative, visually stunning, and useful data visualization tools are upgrading daily (Ostrow, A., 2007). Also, some of the latest developments in web based content production pay attention to the visual character of the content, such as visualizing words and visual web searching (Friedman V., 2007). With the ever-growing speed of these developments in media world, content production is also facing an endless challenge to meet new demands. These developments have influenced to introduce new modules in leading GIS software packages too. In latest versions of ArcView, ArcEditor and ArcInfo, the user (or content producer) can understand the geographic context of data, allowing identifying relationships and patterns in new ways (ArcView - overview 2010). From the other hand, powerful yet user friendly functions in Photoshop CS package provides rich tools to produce and manage graphic contents through the links with GIS software. Google earth plays integral role in data exploring and presenting, by combining Media-GIS products with location using KML file format. GIS technology provides the base technology to integrate data files in a spatially accurate and academically sound manner (esri, 2010) to commercially produce media contents for natural disasters and. Another valuable development is the improvements in MODIS web site, which regularly improve its sub-scenes, achieve system and data mining environments (NASA Rapid Response, 2012).

7. Conclusions

Freely available MODIS sensor images can be successfully used to produce “semi real time” media-GIS contents to display many natural disasters, specially, when the disaster has an impact on wider region. Media-GIS contents have to satisfy number of requirements in production process, such as optimization of esthetic quality of the content and production speed, which is not the priority in conventional GIS and remote sensing studies. Yet, scientists have to guide content producers in this new application, since basics in spatial data visualization and accurately registered GIS data sets are important to set a sound and reliable working culture in media-GIS content production. The case studies presented in this study are presenting disaster information using firmly registered multi-temporal MODIS image layers. Also, the potentials of use of the content in different media portals were discussed. When the content with fresh information is graphically attractive and geographically correct, viewers will obtain a better understanding about nature of natural disasters which increases the public awareness on natural disasters. This approch will help to obtain a greater participation of public in disaster mitigation efforts.

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