

## THE ROLE OF REMOTE SENSING IN FIGHTING AGAINST TERRORISM- A CASE OF PAKISTAN

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### ABSTRACT:

The use of Remote Sensing (hereafter called RS) in the exploration and monitoring of natural resources inherited by land as well as planning and development domains is not innovative and new to the geospatial community. However, benefiting from RS to fight against terrorism can be an innovative and a new approach for many countries such as Pakistan and geospatial community working on this most significant issue in the current global scenario. The growing number of terrorist attacks in recent years in Pakistan has added a new dimension and value to the use of RS data and its analytical capabilities such as pattern recognition in the country. As reliable and timely supply of geospatial data is not only needed by security agencies but also by the rescue workers and teams to save loss of human lives. But the dilemma is that such data sets are mostly outdated and it is not possible to update these data sets through ground survey operations due to law and order situation of the country that started about five years ago and has not ended yet. A possible solution to the situation could be to have an intersection of traditional military warfare tactics and making maximum use of geospatial knowledge and technologies such as remote sensing for a symmetric warfare. Therefore, this paper takes a closer look at the potential supporting role of RS to help antiterrorism and rescue efforts in geospatial domain of Pakistan.

### 1. INTRODUCTION

Geospatial technologies such as GIS and Remote Sensing (RS) are being used for identification, monitoring, tracking, exploration and extraction as well as planning analysis of natural resources in addition to environmental protection and sustainable development. Sustainable development which aims at improving the quality of life is one of the main goals of many countries around the world. Therefore, many national planning and development processes in different countries are based on such achievement. However, terrorism would present a major threat to sustainable development or a sign of its failure. Having said that, appropriate security measures, can contribute to reduction of impacts of terrorism and consequently facilitating the achievement of development goals in the countries like Pakistan. In this respect, considering the crucial nature of geospatial data for security measures as well as rescue efforts, and considering current problems on availability, accessibility and usage of updated geospatial data for security measures, RS can be an appropriate instrument for facilitating anti-terrorism and rescue activities with provision of updated geoinformation. The conceptual, practical and instrumental aspects of RS were and are still the areas of interest for scientific and researcher communities. However, benefiting from RS to fight against terrorism, the focal point of this research, is an innovative approach for many countries like Pakistan as well as geospatial scientific and researcher communities working the world over.

The growing number of terrorist attacks in recent years in Pakistan as displays figure 1, has necessitated the use of geospatial technologies such as RS and GIS. The fact is, terrorist activities are hard to forecast and very difficult to counter especially suicidal attacks. However, the real challenge is to quickly adopt methodologies that facilitate the development of prompt as well as

operational strategies for saving life and property in real time. This is the point where RS and geospatial data play a critical role in effective response and recovery efforts as argues Hiatt, 2002; Huyck and Adams, 2002; Logan, 2002; Williamson and Baker, 2002.

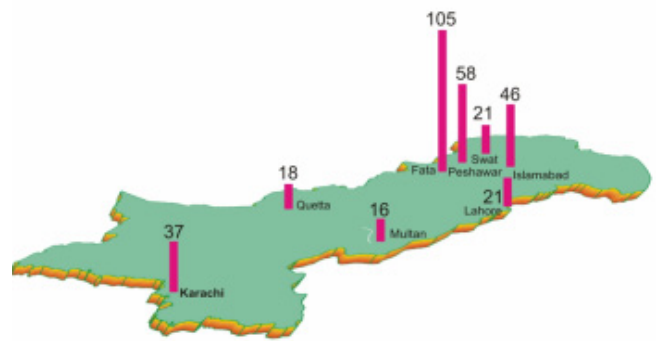


Figure 1. Growing terror-related incidents in Pakistan since 2001 (Source of Numeric Data: <http://ejang.jang.com.pk/3-18-2010/> )

The timely provision of geospatial data and information of the targeted area is needed by the rescue workers and teams to save loss of human lives. A solution to the situation could be the use of geospatial knowledge and technologies such as remote sensing (RS) for provision of updated geospatial information to the needy teams. Therefore, this paper takes a closer look at the potential supporting role of RS to help antiterrorism and rescue efforts in geospatial domain of Pakistan.

## 2. WHY REMOTE SENSING

### 2.1 Ground Realities in Pakistan

Decisions, strategies and action plans are outcome of analysis that is based upon data. Therefore, to make sound decisions, objective, reliable, accessible and usable (Asmat, 2009) data is needed and data that is outdated can not be treated as reliable. As such updated data is inevitable for sound and efficient decision making. Remote sensing has emerged as one of the top shelf data collection technologies to acquire updated data in real time phenomenon. Survey of Pakistan, being the national mapping organization is responsible for collection, maintenance and delivery of geospatial data and services. Land survey through obsolete methods like Plane Tabling was and still is in use to collect geodata. Such data is then converted into digital vector format that takes months. And truth is, topographic and social landscape of the country is changing so rapidly that when map from the collected data is prepared and disposed off, it is already outdated. A comparison of existing data collection methodologies and remote sensing is listed in Table 1.

Plane Tabling Method	Remote Sensing Method
Collected data is in analogue format	Collected data is in digital format
Time taking data collection method	Quick data collection method
Fair weather is essential for data collection operation	No such condition apply due to availability of RADAR & LIDAR
Satisfactory law and order situation is prerequisite	No such condition apply
Data of features existing on ground, is collected only	Data of features existing on and beneath ground is collected
Updation process is cumbersome	Quick updation is possible as satellites revisit the same location weekly or daily in some cases.

Table 1. Comparison of Plane Tabling and Remote Sensing Data Collection Methods

From Table 1, it is obvious that RS is the right technology to be used for data collection or update data in the current scenario of Pakistan. It is recommended, that Survey of Pakistan should make use of its resources such as human, satellite imagery of entire country at 1 meter resolution and technologies for geoinformation extraction and its updation through RS technologies that fortunately exist in the department.

## 3. THE SUPPORTING ROLE OF REMOTE SENSING

### 3.1 For Counter Terrorism

From figure 1, it can be interpreted that out of 322 terrorist incidents, 202 incidents that make up more than 62% of the total number of terrorist incidents took place in areas of Quetta, FATA/Lower & Upper Dir, Peshawar as well as Swat. Some of the common factors in all these locations are:

- These areas are relatively less developed
- The areas are dominated by mountain ranges
- The law and order situation in the areas is poor
- Maps available in Survey of Pakistan of the areas are mostly outdated
- Communication infrastructure in these areas is poor
- The areas are located near Afghanistan border



Figure 2. Areas mostly hit by terrorists in Pakistan since 2001

From Figure 2, it is evident that due to mountainous areas, the administrative bodies, security agencies and rescue teams may have faced great difficulties to access the effected area, as no updated information of the area is available since 2001. In this scenario, the use of RS to generate and extract information from satellite images is the only viable solution. Moreover, trenches and under ground bunkers are also reported in media (<http://pakobserver.net/detailnews.asp?id=21126>) that were and are still being used by terrorists as hideouts. To identify such underground locations is only possible with the help of RS technologies as described in Table 1. Therefore, the arguments and real life example presented so far, proves and underscores the supportive role of RS for antiterrorism and rescue efforts. Brief summary of importance of RS for antiterrorism and rescue efforts is tabulated as Table 2.

Characteristics of Remote Sensing	Value for Antiterrorism and Rescue Efforts
Provision of updated geoinformation	The use of updated information by counter terrorism and rescue teams is fundamental to save loss of human lives and the property.
Identification of under ground objects	It is essential to track enemies hidden in caves and identify explosives buried in ground for safe movement of antiterrorism and rescue teams.
Pattern recognition	Usually video messages of terrorists recorded in open and hilly areas are broadcasted by media. RS can be used to easily

	identify such areas.
Quick information generation	Digital classification can be applied to generate information of the effected areas.
Image Maps	Satellite images can be converted into image maps by overlaying image and vector data of existing maps.

Table 2. Supportive Role of Remote Sensing for Counter Terrorism Activities

#### 4. CONCLUSION AND RECOMMENDATIONS

The use of remote sensing(RS) technologies, knowledge and data for exploration, understanding, determination, and monitoring of factors and their linkage that affect environment, sustainable development and natural resources is not innovative and new to the scientific and researcher communities. There is nothing new about it. However, research should be geared towards benefiting from RS to fight against terrorism that effects the environment, economy and sustainable development activities of a country most. One of the important aspect and after myth of terror related incident is availability and provision of updated geoinformation of the effected area. Remote sensing technology, knowledge and data can be benefited substantially to identify terrorist hideouts over ground, underground as well as for rescue efforts to save precious loss of human lives and property. RS has played a magnificent role in symmetric warfares, which are comparatively difficult warfares. Therefore, RS technology has become a backbone of not only current warfare scenario, but countering terrorism which is dire and emergent need of the day.

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