

Bridging the Gap
Remote Sensing and Needs Assessment:
A Field Experience with Displaced Populations¹

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Abstract

Displaced populations present difficult challenges for humanitarian assistance organizations. Not least are the tasks of locating, denominating and assessing the needs of the displaced when they flee danger and ground access is difficult. Remote sensing can help accomplish these tasks, but is relatively little used in humanitarian assistance operations.

The paper uses a displaced population needs assessment in Liberia to identify key points on how remote sensing can contribute to the assessment process. The points include the need for good operational and strategic planning, the use of appropriate data collection methods (particularly video cameras) and need to involve a broad group of knowledgeable people in data analysis (which is greatly facilitated by the use of video). The paper is of particular interest to two groups: Humanitarian assistance personnel, as an example of a **successful use of remote sensing**; and Remote sensing specialists and commercial service providers, as an example of **low technology, low cost, low complexity, rapid aerial data collection**.

Key words: displaced populations, remote sensing, needs assessments, Liberia

Introduction

Recent events in Zaire show that displacements of significant numbers of people can lead to considerable human suffering. An essential requirement for dealing with large scale displacements is locating and accurately counting the displaced. These tasks are often complicated by poor ground access. Safety is also a concern, as displacements are often caused by one type of conflict or another.

Remote sensing is attractive as a means to find and collect information on displaced populations. Remote sensing permits collection of data from large areas with relative ease. This data can provide relatively exact information on the location, size

¹ This paper focuses on operations to help disaster victims (humanitarian assistance operations) conducted by government and non-government organizations (humanitarian assistance organizations) outside North America, Europe or Japan.

and condition of a population. Also, as the name implies, remote sensing operates at a distance, thus is safer where security is a concern.

At the same time, remote sensing is not a field in which many humanitarian assistance personnel are versed. Concepts of what remote sensing can provide are often driven by stories about high technology "spy-in-the-sky" satellites. In reality, these high-end tools are rarely available to civil users². As well, humanitarian assistance operations as yet lack the technological and financial means to routinely use these high-end tools.

Other, less costly and less complex, remote sensing techniques are often not considered by humanitarian assistance operations for three reasons: 1) unfamiliarity, 2) inadequate planning and 3) cost. Of these three, cost is probably the single most important factor.

Many assistance organizations are low-cost operations. A \$500 per hour aircraft rental charge is a major expenditure. This perspective is reinforced by a culture which views "flying around in aircraft" as diverting limited resources from helping people in need. Only when flying is overwhelmingly more effective is it considered appropriate.

This paper has two purposes in describing an operation to locate a displaced population in Liberia, West Africa: 1) to demonstrate the usefulness of low technology remote sensing for collecting usable information on displacements, and 2) to identify several key points on using remote sensing in rapid needs assessment operations.

Better user-knowledge of remote sensing methods can convince assistance operations to overcome cost concerns and consider remote sensing as a normal tool for dealing with displaced populations. To this end, the paper contributes to bridging the gap between the potential of remote sensing and the requirements faced by humanitarian assistance organizations.

The paper reflects a practical perspective. The aerial data collection effort described was accomplished with the means immediately available (personal observation, fixed-focus still and video cameras, rental aircraft) and without the benefit of a literature search. Readers wishing information on remote sensing are directed toward one of several teaching texts (e.g., Avery) or World Wide Web sites dealing with remote sensing and spatial analysis.

² This will change with the launch of commercial high resolution satellites in the next few years. However, the issues of cost and interpretation remain.

The Setting

In April 1996, fighting broke out in Monrovia, Liberia between factions involved in a civil war which began in 1989. The fighting spread to many parts of the country and stopped humanitarian assistance operations in most of Liberia (OFDA's Situation Reports and DHA's ReliefWeb provide more details).

When relative peace returned to Monrovia in May 1996, humanitarian assistance slowly resumed³. These efforts, hampered by insecurity and limited information on the location of people who had fled the fighting, made slow progress in re-establishing the humanitarian assistance system.

One area not included in the renewed assistance efforts was western Liberia bordering Sierra Leone. The area of particular concern was the Mano River-Lofa River corridor (Monrovia-Freetown road) in Grand Cape Mount county. Here refugees from Sierra Leone and internally displaced (Liberians)⁴ had inhabited camps and the surrounding country for several years before the 1996 fighting. This displaced population had existed on a combination of relief and limited local food production. Limited social services, principally primary health care, had been provided by humanitarian assistance organizations.

The April fighting caused food aid and health services to stop. Assistance had not been resumed by June. There was a growing concern that the health and welfare of the displaced were deteriorating seriously.

The failure to resume assistance to this area was principally due to two factors. First, the area was plagued by groups who continued fighting after peace had returned to Monrovia. These groups, not under the direct control of any faction leader, presented a serious safety threat⁵.

Second, unlike Liberian areas near Cote d'Ivoire or Guinea, cross-border operations could not be mounted due to a civil war in Sierra Leone. This conflict made border areas unsafe and road travel through much of Sierra Leone itself difficult.

Assistance organization material losses were significant during the fighting. Many organizations were very hesitant to resume operations.

⁴ A legal difference exists between refugees and internally displaced, but hereafter both will be covered by the term displaced.

⁵ In October 1996 expatriate and local humanitarian assistance personnel were robbed while working in this area (Lubetkin).

The Assessment

Anticipating a humanitarian problem in Grand Cape Mount, a humanitarian assistance organization present in Sierra Leone decided to undertake an in-depth needs assessment to evaluate whether a large scale assistance operation was warranted⁶. A key element of this assessment was to determine the food security of the displaced. Poor food security, i.e., an increased threat of starvation, would be a key determinate in whether assistance was needed.

The assessment team consisted of four persons with experience in assistance operations involving displaced populations and operating in conditions of insecurity. Initial efforts focused on three areas:

- 1) Collecting information about the Grand Cape Mount situation from sources in Sierra Leone and Liberia.
- 2) Securing agreement to travel to the area. This involved negotiations with Sierra Leone government and rebel authorities, and authorities in Monrovia.
- 3) The logistics of getting to and getting around in Grand Cape Mount.

Initial results were not encouraging. Little up-to-date information was available on Grand Cape Mount except that fighting might be continuing, the displaced had departed the main encampments and food security and health conditions were probably poor. While concurrence was gained for travel through contested areas in Sierra Leone, travel in Liberia remained unsafe. Various ways were identified to get into Grand Cape Mount but all were costly and actual conditions on the ground were not known.

In reviewing progress it was decided the assessment should focus on three short term goals: 1) verifying the displaced had left the Mano River-Lofa River corridor; 2) identifying whether agricultural efforts were ongoing and 3) the condition of sea, air and ground access in the area. Despite the cost⁷, a four person aircraft was rented to overfly the area in an effort to collect information.

The results of the overflight were of considerable use. While sea access was clearly problematic, several fixed or rotary-wing landing sites were identified and good road access in the area was confirmed (see Figure 1).

Concerning the displaced, it was confirmed they were no longer in the camps. In fact, few people were seen in the area. In addition, despite evidence of past farming, little evidence of

⁶ Due to security, access and support constraints the assessment operated from Freetown, Sierra Leone.

⁷ Approximately \$2,000 for a 4 hr flight.

on-going agricultural activity was noted.

More importantly, structural fires were noted: several in a village and several in the vacated camps (see Figure 2). The nature of the fires and the lack of efforts to put them out in the camps suggested security conditions in the area were poor.

The information, pictures and preliminary conclusions from the overflight were shared and discussed with knowledgeable parties in Freetown. These discussions tended to confirm the team's conclusions, although there was a need to not draw too much from very limited data.

As importantly, the results of the overflight provided the first firm information about conditions in the Mano River-Lofa River area for several months. The impact of this information was reinforced by the photos taken during the flight, despite their poor quality⁸.

At the same time, a major question remained. While the overflight had confirmed the displaced were not in the camps, the location of this population remained unknown. Two possibilities were considered: 1) the displaced were hiding in the bush near the former camps or 2) the displaced were moving en mass north to a safer location⁹.

Experience suggested movement over any distance would cause food and health conditions to deteriorate quickly. However, if the displaced remained near the former camps their condition could be less difficult, as they might be able pursue limited agriculture and harvest wild foods. Thus, locating or ruling-out a movement to the north was key to planning further assessment operations and assistance options.

Given the success of the first overflight a decision was made to make a second flight north from the Mano River-Lofa River corridor to search for movement or concentrations of the displaced. A larger aircraft (An-2) was used and a hand-held video camera was brought along to document observations.

This second flight was less successful than the first. No population movements were noted on the few roads located. Large concentrations were not seen in the very few settlements in the area. However, the vegetation north from the corridor, high canopy rain forest, often made seeing what was on the ground

⁸ Pictures were taken with a fixed-focus 35mm camera costing under \$30 and processed by a walk-in photo service in Freetown.

⁹ Information indicated the displaced had not moved en mass into Sierra Leone or to Monrovia. Movement to the north was suggested by humanitarian assistance organization personnel who had left the camps after the April fighting.

impossible. The possibility of a large population hidden under the canopy could not be dismissed¹⁰.

At the same time, the video camera proved extremely useful in documenting sites overflowed. Post-flight viewing of the video tape permitted a number of knowledgeable people to participate in the analysis. This was essential for two reasons: 1) the assessment team did not have long term familiarity with the areas overflowed, and 2) group discussions produced more supportable (i.e., balanced) conclusions. The latter was important as the information collected tended to be less dramatic than the fires seen on the first flight.

Together the flights provided sufficient information to justify proceeding with the more lengthy process of gaining ground access to the Grand Cape Mount area. Logistics options were clear, as was the problem of security.

While the displaced populations had not been located, the picture of where they could be was clearer. It was also possible to conclude that displaced populations' food security would worsen over time. The displaced were receiving no food aid and, as displaced, had few reserves. Not much active cultivation was evident and poor security was preventing access to food from other parts of the country.

What was not clear was the current (June 1996) condition of the displaced. In the end, this could only be determined by going in on the ground.

Conclusions

Several simple conclusions can be drawn from the operations summary. First, simple remote sensing methods (personal observation, still and video photos) quickly generated data and analysis which improved the understanding of the options and needs for dealing with displaced populations in Grand Cape Mount county.

On the negative side, the inability to determine what was happening under the forest canopy was a major limitation. However, while many questions remained, the information collected focused efforts and options in a way not been previously possible.

Second, still and video pictures improved the credibility of the flight results. In review sessions and briefings the images helped engage knowledgeable people in discussions about what might be happening in Grand Cape Mount. This promoted a consensus on analysis results and further actions. This was important to the assessment effort, as a consensus on need was critical to

¹⁰Subsequent information indicated the displaced had remained hidden near the former camps.

further funding of the assessment and the likelihood of funding for relief operations.

Third, information had been collected rapidly and at acceptable risk. Ground operations would have not met either of these accomplishments.

Fourth, at a total cost of less than \$6,000, the flights were viewed as a very good deal, given the nature of the information collected and the ease of the operation. On this point, the assessment was lucky that the flight costs were low.

Given the positive outcomes of the overflights it is remarkable another organization had not used this technique earlier. Administrative reasons were certainly important (personnel in Sierra Leone were concerned with Sierra Leone and not Liberia). But, discussions at the time strongly suggested that the idea of renting an aircraft and seeing what Grand Cape Mount county looked like was a foreign concept to many.

The Grand Cape Mount overflights also suggest several general pointers about how to mount an air reconnaissance for displaced populations. Probably most important is the planning of the operation. The assessment team compared several aircraft options, worked out detailed flight plans, collected background information and established a plan in case the aircraft did not return. These actions significantly increased the safety and chances of success of the flights.

Image collection is critical. While still pictures are useful, video was far superior. The detail collected was amazing, to the extent that details not seen during the flight were located on the video tape¹¹.

Taped data also permits post-flight analysis, such as counting houses and crop identification, which is impractical during a flight. A post-flight analysis done with a group of knowledgeable people smooths out biases and increases the depth of information generated. Simply put, with video, aircraft size does not limit the number who can see what is happening.

It is also important for aerial operations to take place within a well developed plan for identifying information requirements and objectives. The information collected about Grand Cape Mount would have had limited impact if it had not been part of a formal plan to assess whether aid was needed and could be delivered to Grand Cape Mount.

¹¹ Global Positioning System data input during taping, akin to date-and-time stamping, greatly improves post-flight analysis. It also holds the option for incorporating images into Geographic Information System data bases.

In conclusion, the Grand Cape Mount overflight demonstrated the utility and potential for low technology aerial remote sensing in dealing with displaced populations. The flights bridged a gap in information about a displaced population by using appropriate technology and a degree of innovation. Aerial remote sensing, when backed by good planning and preparation, can be expected to make significant contributions to assessing the needs of displaced populations.

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Figures

Figure 1

Mano River - Lofa River
Road
Toward south east, with
two village/camp areas
on left of road.



Figure 2

Mano River -
Lofa River Road
Toward north
(main road runs
east-west),
abandoned camp
with burned and
burning
buildings, next
to village.

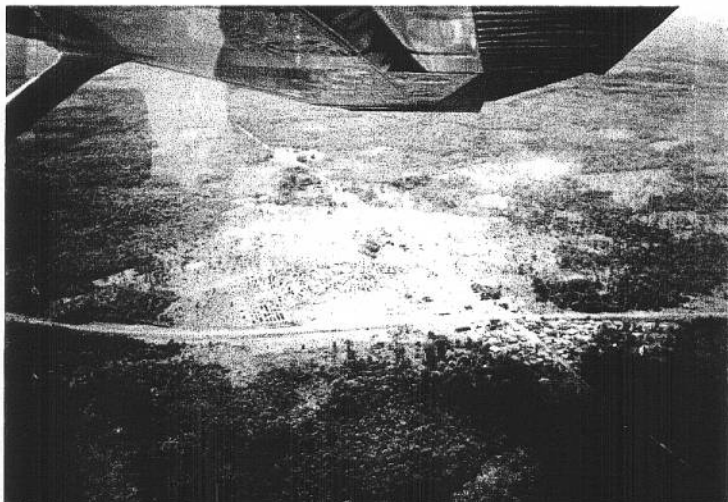


Figure 1



Figure 1
Main River - Main River
Road
Toward north road, with
two village, camp areas
on left of road.

Figure 2

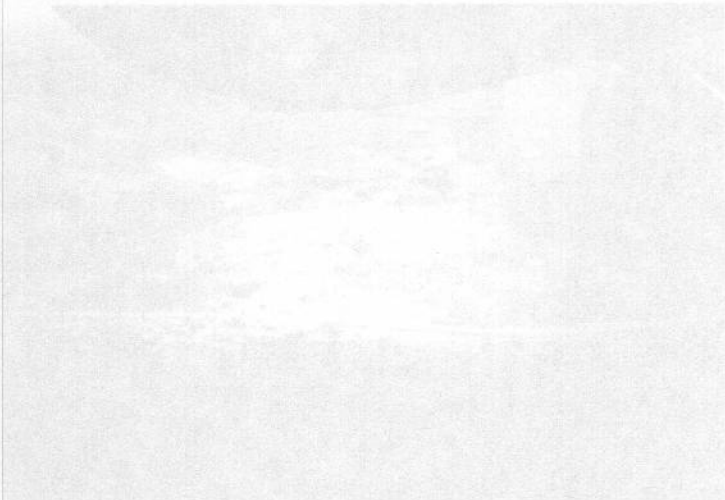


Figure 2
Main River Road
Toward north
Main road runs
east-west,
abandoned camp
with burned and
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to village.