

# IMPACT STORY

## Geospatial Information Technology for Evidence Based Decision Making

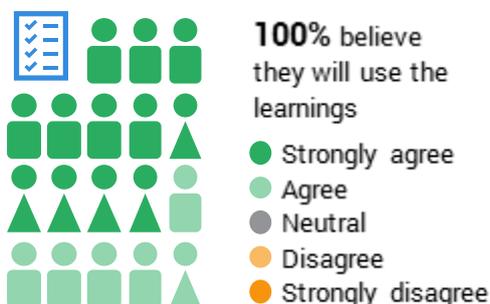
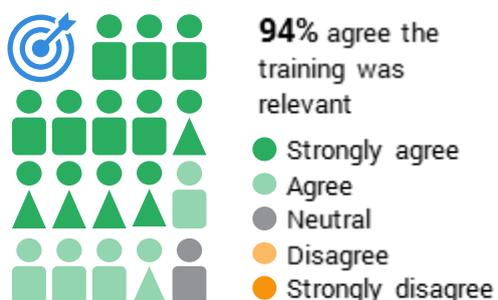
### UNOSAT Training in Bhutan

#### Background

The UNITAR Operational Satellite Training Programme (UNOSAT) contributes to human security, peace and socio-economic development by providing integrated satellite-based solutions for governments as well as relief and development organizations within and outside the UN system. As part of its capacity development activities, a two-week training programme took place in Bhutan, with support from the State of Qatar. With funding through the newly-established Strategic Framework Fund, the programme aimed to enhance the use of geospatial technologies for evidence-based decision making at the national level. This in-country training was organised in cooperation with the National Land Commission (NLC) Secretariat of the Royal Government Bhutan, an institution that was only created in 2008. It brought together government officials from the Ministry of Information and Communications, Ministry of Agriculture and Forests (specifically the NLC), and Ministry of Economic Affairs.

The training developed knowledge and skills on applications of Geospatial Information Technology (GIT) and its operational use in various domains: land-use, urban planning, forestry, environmental monitoring, hazard mapping and disaster risk reduction. The GIT lab exercises using datasets and real case scenarios (e.g. finding the optimal location for a new hospital in Thimphu using multi-criteria evaluation) helped participants practice and apply what they learned from theoretical lectures. For a longer lasting impact of the learning experience, UNOSAT set up an online community of practice where participants can request technical support during and even after the training. There are also plans to monitor performance improvement of participants together with the NLC to support knowledge retention and to establish ad-hoc live web map platforms that participants can benefit from when they carry out the national projects.

In an evaluation conducted immediately after the training, all but one participant agreed that the content of the session was relevant to their work (figure 1). Additionally, all agreed that they will use the information acquired in their work (figure 2). When this information is taken and combined with the experiences of Sonam and Pema since the training, the focus of this impact story, we can begin to get a picture of the impact that this training has had, and hopefully will continue to have in the future.





# SONAM TOBGAY

Senior Survey Engineer, National Land Commission, Bhutan

## reports on greater data authenticity after the training

**Talking with Sonam**, who was video calling us from outside in the green forests of Bhutan where he works, it was soon clear how passionate he is about his work; he is engaging, enthusiastic and knowledgeable. It was also clear that, for Sonam and his team at least, the UNOSAT training has had an immediate impact on the work that they do.

Sonam has been working with the National Land Commission for seven years and he is currently a senior survey engineer. For at least the past five years he has been working to collect data and maintain the national spatial data infrastructure (NSDI) in Bhutan, and through his work he found out about the UNOSAT training. There are two projects that he has been focusing on for the last three years. The first is the topographical base map preparation for the entire country. At a scale of 1:25000, this dataset will form the core of Bhutan's NSDI. The National Cadastral Re-Survey Programme is the second project he is working on with a team of 80 people (20 surveyors). He informs us that these two projects will contribute towards developing a comprehensive repository for NSDI and will eventually inform the National Land Use Zoning (NLUZ) project. This is something that is particularly important in Bhutan, where approximately 70 per cent of the land is tree covered while arable land is only about seven per cent. The zoning project will help to delineate the land use zones of the entire country, to assist in the optimal future utilisation of natural resources in a sustainable manner. With both projects the impact from the UNOSAT training can already be seen. The training focused on the use of GIT in evidence-based decision making. This is something that Sonam and the zoning project strive to integrate, and the training provided the tools and necessary know-how to support the implementation of such a massive initiative.

Besides meeting with colleagues and sharing some of the information and knowledge that he has gained thanks to the training, there are two very practical and specific examples of how he is already putting this knowledge into practice. Since the training ended he has performed a spatial analysis which will determine the average slope of a parcel of surveyed land. He reports that as per the country's laws, generally, land with a gradient of more than 45 degrees is not used for agriculture and construction purposes. Having this criterion as a background, he used the newly learned techniques from the training to design an analysis which calculates the average slope of a certain region. Afterward, by overlaying with the data that was being surveyed in the field, he could crosscheck what the average slope really was, allowing for better performance thanks to **more robust analysis and greater data reliability**. These were all techniques and knowledge that he acquired from the training, which aligns clearly with UNITAR's objective of strengthening evidence-based decision making.



Currently, there are approximately 20 data collectors in the field working under Sonam on the National Cadastral Resurvey Programme measuring thousands of land parcels. In the past, it has been very difficult to get in touch with all these collectors, due to the remote locations they may be operating, presenting a difficulty in coordinating their work. The course introduced an app called Epicollect5, which Sonam has since been using to monitor and crosscheck data collected in the field. He can quickly see who is doing what and where, receiving information, videos and pictures daily. All of this can be visualised using the app, allowing him to track data in near real time, thereby making **more efficient and effective use of time and resources**. The project has scaled up, and there have already been discussions to implement the use of these technologies at the national level. Sonam credited the culture of curiosity that exists within his department, and in Bhutan in general, for the success in implementing these new ideas and tools. There is a tangible excitement about the potential that GIT offers.

The practical application of knowledge gained during the course has **increased the quality, speed and efficiency of Sonam's work**, but more importantly for Sonam, the data that his department now collects has more credibility. There are more sources of data, meaning they are not only dependent on data from the surveyor, as field data was not always reliable. Using multiple sources of data and data analysis combined with data from Epicollect5, one can perform cross validation. Data authenticity was the main concern of his project and the training has really helped in this regard, **resulting in better use of data, better quality of reports and more confidence in the information they are presenting**.

Before the training Sonam had limited experience in the use of GIT, although one gets the impression he is being very humble when discussing his expertise. Learning about the various functions and tools of software like ArcGIS was one part of the training. For Sonam, of equal or perhaps even greater importance than the tools and the types of data one can collect, is how one uses the data. This more theoretical aspect, of new ways of thinking about the use of data, was of most value for Sonam, expanding his understanding of what is possible. It will perhaps have the longest and most far-reaching impact. As he climbed higher in the green hills to get a better signal, Sonam said that the ***“training was a door... to the possibilities that [GIT] can give us.”***

Sonam is excited about the future, and the continuing impact that the training will have. There have been discussions about a joint venture between UNOSAT and the National Land Commission, building partnerships for training, disaster risk reduction and sustainable land management. This training has created advocates for evidence-based decision making in Bhutan. The true impact of this will hopefully be both long lasting and far-reaching.



# PEMA ZANGMO

Survey Engineer with the National Land Commission Bhutan  
**draws inspiration from the training**

**The potential for** future impact can be seen with Pema, another participant of the UNOSAT training. Only two years into her job with the National Land Commission as a survey engineer, Pema has a different scope of work than Sonam. Nevertheless, the training has already had some impact, with Pema raising the use of the Epicollect5 tool in meetings, with plans to explore the use of the app further with her colleagues. They have already used it to carry out surveys and field work. She has also carried out a project to collect information on plot and building details for a local project using the app. She is a member of a taskforce which is carrying out a sustainability assessment for the construction of a power plant in 2040, using a weighted index method and multi-criteria decision analysis (MCDA). In the quarterly taskforce meetings Pema attended before the training, she at times felt she was slightly lost and found it hard to follow some of the discussions. Equipped with knowledge from the training, in the latest meeting she could follow the MCDA, understand the uses of GIT and could contribute in a meaningful way. This may not be a broader impact, but for her confidence and potential for advancement in her career, it is profound. The most exciting impact of the training is still to come. She has plans to write a paper on the use of GIT, linked with her bachelor thesis on urban planning and spatial transformation. She says she has been inspired by this course. Again, the impact that is most clearly visible stems from fostering people with a passionate understanding of the importance of evidence-based decision making, in jobs where they can make a real difference, equipped with the tools necessary to do so.

A plan to follow up with Pema and Sonam in 6 months' time has already been set, to see if and how they have continued to use what they have learned thanks to this course. Touching base with them again will allow us to follow them on their journey as this training hopefully continues to have an impact with them further down the road. This will include a discussion on the monitoring of performance with NLC supervisors, as envisioned in the project document. The NLC sent 15 participants to this training, and if the impact is similar for these participants as it has been for Sonam and Pema, then evidence-based decision making will be integrated into the NLC for some time to come.

## **Conclusion**

This Impact Story was written only four weeks after the end of the training. As such, we were worried about any potential impact being measurable so soon after the event. While this may be true in the sense we cannot yet measure a wider impact of the course, talking with Sonam and Pema it was clear that in some respects the impact has been immediate. The training has changed how they work, increasing efficiency and data reliability. More importantly, it has allowed them to think about data differently, presenting them with a different perspective. Integrating the use of data for evidence-based decision making will have a profound impact



on the work of Sonam and Pema, and by extension the NLC. If they do so, and the evidence suggests they are up to the task, this will help contribute to the SDGs, benefit their institution generally and by extension Bhutan, in whatever small way. UNOSAT will continue to be a partner in their exciting journey towards evidence-based decision making through technical backstopping services from its programming centre in Bangkok.

### GIT and how it contributes to the SDGs



Over the past two decades, Geo-spatial Information Technology has rapidly developed and is now being called an “enabling technology” due to the benefit it offers across different application domains. GIT can help analyse and better understand why and where things have happened in the past. By extension, it can also show us why and where something might happen in the future, allowing for more informed decision-making and better use of resources.

GIT applications and their use for evidence-based decision making can contribute to the implementation of the Sustainable Development Goals (SDGs). The clearest link that can be made with this training is with SDG 9: Industry, Innovation and Infrastructure and SDG 11: Sustainable Cities and Communities. It may also have knock-on effects to several others, due to the interrelated nature of the goals. For example, one of the projects discussed above relates to the construction of a new power plant in Bhutan, and is therefore linked with SDG 7: Affordable and Clean Energy. Sustainable use of land also potentially has an impact on SDGs 6, 8, 13, and 15. The link with SDG 13: Climate Action, is particularly pertinent to Bhutan, the world’s only carbon negative country – it takes more carbon out of the atmosphere than it puts in. Ensuring this continues to be the case, through sustainable land management, allows Bhutan to be a guide for the rest of us. Finally, there is a hope that this will be the start of a joint venture between UNOSAT, the National Land Commission, and other agencies in Bhutan, thus contributing to SDG 17: Partnerships for the Goals.



*UNITAR is grateful to the State of Qatar for its contribution to the Strategic Framework Fund. The Strategic Framework Fund is a facility to support the implementation of the UNITAR 2018-2021 Strategic Framework and to help UNITAR contribute to the achievement of the Sustainable Development Goals. Emphasis is placed on helping countries in special situations achieve the Goals, including the least-developed countries, the landlocked developing countries and the small island States.*