INSTITUTE FOR CONSCIOUS GLOBAL CHANGE

WALKTHROUGH OF GIS ASSISTED SDG IMPLEMENTATION

This presentation is geared towards providing a basic understanding of Geographic Information Systems (GIS) in the context of the United Nations' 2030 Agenda while providing examples of how GIS could be used to support each goal.

WHAT IS GIS?

Geographic Information Systems (GIS) is a computer based program that allows us to visual, analyze, map and interpret data anywhere on earth. A user can essentially describe any geologically located point on earth with as much data as can be gathered about it. In general GIS gives us the ability to relate data to real places on the Earth's surface and provide a means to analyze that data in different contexts. With all of this information at your fingertips, in one location, relationships, patterns, and trends can be easily identified and solutions to problems sought.

One of the most important aspects of GIS is the ability to visually overlay different themes of data to reveal insights otherwise hidden from viewing just a single data set. An example could be overlaying demographic data with hospital facilities to see if there is a relationship between a density of healthcare services and a population's quality of health. The end products of GIS include maps, models, graphs and analytical reports providing a holistic view of an area's well-being.

HOW CAN GIS BE USED TO HELP MEET THE SDG SUSTAINABLE DEVELOPMENT GOALS?

GIS allows users to easily spot trends and relationships between data sets to provide a better understanding of why things are the way they are at that location. As an approach that considers all related factors to sustainable development, GIS can better inform policy implementation and resource allocation to facilitate inclusive growth.

GIS can make use of mobile devices like smartphones as collection units, to allow crowdsourced data and citizen participation in reporting of data. Not only does this involve people on the ground level, but when properly guided "citizen scientists", equipped with mobile apps, can reduce the workload of local governments and organizations by providing much of the relevant data. Open source GIS can create a pool of data available to any interested party, for a variety of needs.

HOW CAN GIS BE APPLIED TO EACH SUSTAINABLE DEVELOPMETN GOAL?

GOAL 1: Envisioning poverty at the community level using data can allows cities to see exactly which areas are in greatest need and provide a better understanding of what access they have to services and employment. GIS and the MEP app will be able to not only visualize poverty from above but also to better understand the story of everyday life on the ground. GIS also has tools which makes it possible for the user to estimate current conditions and possible impact assessments with little data.
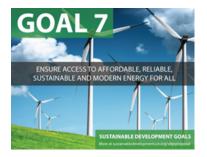
GOAL 2: GIS can be used to plan for and improve various factors involved in the production and movement of food. By analyzing soil, water, sun, and wind conditions we can help determine how to more efficiently plant, grow and harvest. GIS can also help farmers strategically plan for organic pest control, reducing the need for chemical solutions. On a much more broad level GIS can analyze an area's "food shed", where the products are currently coming from, and how to get food products to markets more efficiently and sustainably, helping the producer, the consumer and the environment.

GOAL 3: GIS can be used to aggregate and overlay several different data sets. In the realm of healthcare, this means we can have data from individuals and households, along with data from health clinics and details about disease prevalence and spread. These data sets all help us to get a more holistic picture of the health and well-being of an area and its' inhabitants and can help governments and organizations better target their services in order to improve the health of all.

GOAL 4: At the household level, GIS can be used to see which homes have their children enrolled in primary and secondary educational programs and track the success or failure of initiatives seeking to increase enrollment. GIS can also be used to track the development or redevelopment of education facilities, as well as calculate their service radius to make certain there are enough facilities in the area to meet the needs of local population. The network analysis tools in GIS makes these assignments easy to perform and interpret.

GOAL 5: Reporting of gender based discrimination and violence with geolocation would allow stakeholders to see exactly where incidents have occurred, the severity of the situation, and begin implementing policies to address the situation. GIS also has the ability to view things such as land ownership, school enrollment, health services and other relevant factors through a gender specific lens. This will help keep gender oppressing entities in check and help organizations and governments better apply their resources to have the greatest impact.

GOAL 6: GIS allows for the collection and visualization of data on water use. In its simplest form GIS can locate and describe an area's water resources (wells, cisterns, canals, etc). GIS can also help understand how water is being consumed, along with strategies and technologies that can be developed to target specific trends and then scaled up to the entire community or country. GIS can also perform tasks such as estimating rooftop areas in a community, combine that with annual rainfall data, and to calculate the potential volume of water runoff that can be collected stored and used.

GOAL 7: GIS can be used to assist in planning for development of renewable energy sites. Locations can be investigated and assessed so that the effectiveness of energy collection can be maximized. A quick analysis of rooftops can show how much space is suitable for installing solar panels and of those rooftops, which receive the most light during the course of the day. Important factors such as wind patterns and strength, and tidal and river flows can also be assessed and mapped to assist with further, smarter and more targeted renewable energy development.

GOAL 8: With GIS, many factors that contribute to economic growth can be detailed and mapped. For instance data on employment, median income, type of employment, etc. can all be overlaid and viewed in relation to one another showing where economic and job growth is happening. Successful policies can then be identified and applied to underperforming areas. GIS is a technology as well as a very marketable skill for diverse types of employers. Teaching students to think geospatially (in terms of how data relates to other data on the ground) allows them to look at the world around them and see it as a whole, rather than discrete parts.

GOAL 9: When it comes to infrastructure, GIS can provide a plethora of relevant and essential data. Via GIS analysis we can assess things such as current traffic patterns, use of public transportation, gaps in coverage and lack of access to essential infrastructural resources, etc. This can help us determine where the most efficient and effective infrastructural improvements can be implemented to have the greatest impact. Through crowd sourcing information and data gathering we can get a holistic picture of the health of a place's infrastructure from the people who use it.

GOAL 10: Several factors have caused inequality within and between countries, which range from ecological to economic factors. Geo-Statistics and Geo-Visualization techniques offer adequate solutions to achieving this goal. GIS provides the basics for comparison parameters or factors of inequalities which can be easily visualized and mapped. Where the reasons for inequality may be unclear, overlaying and comparing certain data sets via GIS, previously unseen factors and patterns can be discovered.
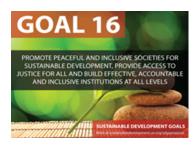
GOAL 11: Through GIS, and particularly the proposed MEP application, cities can be planned out to serve the best interests of all of its citizens through in depth data and storytelling. GIS can help identify areas which are underdeveloped in all of these regions. Maps of crime, discrimination and disaster susceptibility are just some examples of applicable GIS data. Via the MEP app we will also be able to project and display projected development projects. We can not only visualize and predict the impact of certain projects but can virtually envision what would be necessary to move an area in the right direction.

GOAL 12: Commonly used GIS software contains network analysis tools which can be used to investigate the demand and supply relationships between services and demand areas. These tools are uniquely equipped to suggest areas where consumption is high, as well as areas with high production. More efficient and effective methods for getting consumable products into cities and waste out can be effectively planned and visualized via GIS and geodesign.

GOAL 13: Climate change and its consequences have become a global concern. Many factors that contribute to climate change, as well as many of the consequences of a changing climate, can be effectively visualized, measured, compared and disseminated via GIS. Things such as weather patterns and changes, aerial shots of shrinking glaciers and documented sea level rise, to name a few, can all be readily comparable and available via GIS.

GOAL 14: Study and publications suggest significant changes in marine and aqua life in the oceans and water bodies. Using images and data gathered through sonar and digital images obtained from satellite and other remote sensing techniques, we can see underwater life as never before. This technology can be used to identify and learn about the patterns of endangered marine life forms in the oceans, can promote sustainable fishing techniques by collecting data on aquatic populations, and oil spills and other natural disasters, these can be mapped and their potential impacts and patterns displayed.

GOAL 15: Satellite and aerial imagery data are very important for studying land cover and land use changes. Satellite images taken over time are capable of providing useful information of the changes caused by or which are causing land degradation, biodiversity loss and desertification. On the ground data can also be collected and compiled from organizations and governments concerned with these issues.

GOAL 16: Products of GIS such as maps, graphs and analyses can expose situations of inequality and provide the basics for truly sustainable development. Information on governments, organizations and the private sector can all be available and comparable. Factors such as incarceration rates, income disparity, government projects and spending, and even corruption, can all be mapped, viewed and compared via GIS.

GOAL 17: MEP, through GIS, believe that by sharing results and information among stakeholders and countries, everyone can benefit. Programs that have been implemented in one place may be instrumental to assisting another half way around the world. Via the MEP app, information on successes and failures or policies and programs will be widely available. Future development is going to effect the whole planet and we believe that GIS is instrumental in the comprehensive and collaborative decision making for a sustainable future.