A MULTI-SENSOR, MULTI-DISCIPLINE, MULTI-PARTNER APPROACH

Coastal and Littoral Studies

For more than a decade, coastal zone studies, including hydrographic survey-based mapping, have been growing in size, complexity and applications. With the growing need to better baseline and define the impacts of sea level rise, programmes are now combining many diverse sensors and data to best map the areas and provide exceptionally high-quality precise information for predictive models. To a large degree, this is a direct result of the continuously expanding success of these programmes. Success can be measured in terms of data quality, performance and the expanded applications to stakeholders and other users, and directly measurable by the accuracy of the models that are eventually applied. As of this writing, worldwide stakeholders and their associated applications have expanded to include multiple levels of government (local, state and federal), members of the general public, industry and academia.

Several recent events have emphasised the importance of these programmes as well as the need to expand applicable technologies, and improve the accuracy of models to better anticipate key impacts such as flooding and coastal erosion. Examples include the significantly reduced global ice pack in the Arctic Ocean which has led directly to increased erosional activity along exposed low lying coasts in Arctic seas of the North American continent. Another example is that the impacts of the 2012 Hurricane Sandy are still being measured and evaluated to baseline the extensive impacts along several hundreds of kilometres of coastline. Whether the concerns be changes in ice covered waters or impacts from hurricanes, the trends require a multi-sensor approach to accurately measure the conditions that are relevant to understanding all aspects of the coast. A typical comprehensive study now includes mapping data from high-resolution airborne digital cameras, Lidar and Radar systems, along with airborne gravity measurements to improve the geoid accuracy.

All of these data lead to a significantly improved ability to develop comprehensive applications to support research and analysis such as:
- Tsunami/storm inundation models
- Land Use/Land Cover and benthic habitat studies
- Beach erosion/beach replenishment baseline and change detection
- Geologic structure and interpretation, including nearshore active faults
- Sea level rise baseline
- Coastal development and industries, including Renewables

As technologies, experience and global capabilities improved, the programmes became more comprehensive and more multi-dimensional and continue to grow in size. It is not unusual to conduct studies on a country-wide scale or along coastlines in excess of 1,000km in length. This has been an important development in our understanding of coastal processes and impacts. A large-scale programme allows for the inclusion of a regional understanding by countries and communities. As with many similar ideas and concepts, the large-scale approach was first developed and successfully implemented in California as the State Mapping Project (CSMP), which continues to provide exceptional baseline and other data applications for a continuously growing variety of stakeholders.

Large-scale multi-sensor, extended coastline programmes can and should be expanded worldwide to better protect populations and industry located within impact zones on every continent.