

Spatial Imagery Acquisition for the Management of Coastal Regions

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Background

The Department of Natural Resources and Water (NRW) has maintained an aerial photography program to record the development of Queensland from the 1940's until 2004, at scales of 1:25000 to 1:80000, with particular emphasis on the eastern half of the State.

Since the late 1970's the Environmental Protection Agency (EPA) has acquired aerial photography at scales of 1:12000 to 1:50000 to support the protection of coastal beaches.

In the 1990's better management of vegetation became a national priority, and NRW introduced the State Land and Tree Study (SLATS) program to monitor land clearing. State-wide satellite imagery coverage has been acquired annually to support this program. The 25m Landsat imagery has been orthorectified and used to produce several products such as vegetation maps. All imagery is readily available from NRW.

By 2004 imagery was being used extensively across many State and Local Government agencies. The Queensland Spatial Information Council (QSIC) published a study which exposed several problems with the use of spatial imagery in government and provided recommendations for reducing problems such as duplication and difficulty in accessing imagery.

As a result of this study,

- a QSIC Spatial Imagery Working Group has been established,
- NRW has provided a coordination role to ensure imagery is acquired with a licence that allows whole of government use wherever possible,
- Base level imagery required to support public administration has been identified and published in the Queensland Spatial Imagery Acquisition Plan 2006-2010, and
- A Treasury evaluation of the implementation of the Spatial Imagery Acquisition Plan and funding submission has been prepared.

The Treasury evaluation identified approximate annual expenditure by Queensland Government agencies on imagery. In order to maximize value for money spent on imagery acquisition, a Subscription Plan has been developed whereby government and non-government agencies may contribute to a fund used for the coordinated purchase of imagery in accordance with the Spatial Imagery Acquisition Plan. Agencies pay a base level subscription that entitles them to a copy of all imagery purchased with subscription funds and may make additional contributions to acquire specific imagery to meet their needs. It is expected that State Government agencies will contribute the amount indicated in the Treasury evaluation.

Current status of imagery coverage in Queensland

Over the last two years significant progress has been made in the coordinated acquisition of imagery for multi-agency use.

Queensland has complete coverage of recent (post June 2005) SPOT imagery.

- 2.5m SPOT imagery is available over eastern catchments and the Murray Darling Basin
- 10m SPOT imagery will soon be available over the rest of Queensland. Licensees may upgrade this to 2.5m resolution for \$2.20 per sq km.

50cm orthophotos are available over the Tully – Cairns – Atherton region and Herbert River caneland areas.

Quickbird or Ikonos imagery is available over all Indigenous communities, including inhabited Torres Strait Islands, with Lidar DEMs acquired over coastal communities around the Gulf and Lockhart River.

High resolution orthophotos are available over many larger urban centres in south east and coastal Queensland.

The need for coastal imagery

The spatial Imagery Acquisition Plan identifies a need by several agencies for high resolution imagery over the coastal zone. The Environmental Protection Agency uses stereo aerial photography with a resolution of approximately 25 cm for monitoring beach erosion and development. In general the agency uses photographic prints, although scanned imagery is sometimes used in geographic information systems (GIS).

Many coastal City and Shire Councils use orthorectified imagery at resolutions of 15cm to 25cm to support a wide range of Local Government responsibilities. This imagery would provide valuable support to Police, Emergency Services, the Main Roads Department, Queensland Transport, Natural Resources and Water, Local Government and Planning and other State Government agencies for functions such as asset management, infrastructure planning and urban development, homeland security, disaster mitigation and emergency response, vegetation, water and erosion monitoring and property valuations. High resolution imagery is also valuable to many non-government service providers.

Primary industry organizations such as the sugar and banana industries use imagery at resolutions of 50cm or smaller.

Implementing the Spatial Imagery Acquisition Plan

A five year program for imagery acquisition has been developed. The program

- conforms to the Spatial Imagery Acquisition Plan,
- is sequenced to continue from current imagery acquisition projects,
- provides a focus for planning projects in 2007.

The main focus for the 2007 program is:

- Urban imagery in SEQ.
- Coastal imagery in Central Queensland.
- Coastal digital elevation models

Urban Imagery

Already high resolution imagery has been acquired over Brisbane, Noosa and the Gold Coast through the Subscription Plan.

Coastal imagery

Coastal imagery is acquired by the Environmental Protection Agency at intervals of about four years. In the past unrectified stereo aerial photography has been acquired specifically to meet the needs of the EPA. The development of spatial information processing has created new opportunities for using imagery for monitoring resource condition and trends. However greater accuracy is required to enable registration of imagery with other spatial datasets and imagery acquired at different times.

A major requirement of the EPA is for imagery to be acquired within two hours of low tide, with restrictions on sun angle to minimize solar reflections. This limits the flying time available

for imagery acquisition, resulting in a higher acquisition cost than would be expected from similar projects without these restrictions.

Emergency Services Queensland has a need for high resolution imagery over coastal communities to support its Safeguarding Cyclone Communities project and to enable more effective disaster mitigation and response planning. The Main Roads Department requires similar high resolution imagery over the Bruce Highway.

This imagery can be acquired more cost effectively as a single project, with each agency contributing to the cost. Indeed, it is unlikely that all the imagery would be acquired if each agency was individually responsible for the purchase of the imagery it needed.

By making significant contributions to the Subscription Plan, and combining those contributions with available funds raised through other subscriptions and contributions, agencies can work together to develop a project that meets their needs and the broader needs of government, as identified by the Spatial Imagery Acquisition Plan. This project can then be promoted to other interested agencies in the region, such as local government, port authorities and the sugar industry, to raise additional contributions to ensure all local needs are met.

The EPA is now reviewing its requirements in consideration of the Spatial Imagery Acquisition Plan. With the increasing use of GIS the agency is expected to specify georeferenced imagery in future acquisition projects.

Coastal digital elevation model

Although the main need for an accurate digital elevation model over the coastal region comes from the need for better data for emergency management, many other users will benefit from this data. In recognition of this need, NRW is seeking Natural Disaster Mitigation Program funding to acquire Lidar digital elevation models over low-lying coastal areas from Hervey Bay to Townsville. Following the recent tsunami threat, additional funds will be sought from the Queensland Government to increase coverage to a height of approximately 15m AHD.

Conclusion

The need for spatial imagery over the Queensland coastline has been addressed in the past by the Environmental Protection Agency in a way that effectively meets the needs of that agency.

Greater appreciation of the value of imagery in supporting a wide range of operations across all levels of government and industry is driving a more coordinated, whole of government approach to imagery acquisition.

In recognizing this trend, the Environmental Protection Agency, the Department of Natural Resources and Water, and Emergency Management Queensland are working together to acquire imagery that will meet both the individual needs of each agency and the broader needs of other government and non-government agencies.

Together, these data sets will provide an excellent spatial reference for ensuring the protection of the natural, cultural, economic and social values of Queensland's coastal zone.