

## MAIN ISSUES AND CONCLUSIONS

Despite the separate and distinctive topics of discussion by each group, during the reports to the first plenary session by each small group discussion leader, and subsequent open-forum discussions a number of common issues and concerns became apparent. With respect to the workshop objectives, they may be categorised as:

### 1. Sampling Design and Methods

- . There are problems of sample design due to the scale of the GBR Region, access difficulties and cost (both time and funds).
- . There is scope for improved coordination of sampling effort.
- . There is a need for GBR contaminant sampling to be stratified (to detect human influences), and replicable (for monitoring change over time).
- . Areas of the GBR Region should be sampled as part of a national monitoring program if comparison of data obtained is to be meaningful.
- . Other than for scientific investigations into e.g. the presence or absence of specific compounds, any future routine sampling undertaken as part of a monitoring program will require the responsible agency to clearly identify its program objectives if a valid sample design is to be employed.
- . Because the goal of most data acquisition programs is to enhance system understanding and/or improve predictive capacity, sample data should be centrally collated, and, where practical linked to the needs and applications of "system models", such as those being developed at the Australian Institute of Marine Science.

### 2. Analytical Techniques

- . Problems of intercalibration are common, but are being overcome.
- . It is highly desirable to standardise field measurement and laboratory procedures (UNEP procedures seem to be applicable in many instances).

3. Levels and Significance

- . Levels of the three contaminant groups in the GBR proper are generally in the lower range of detection.
- . The highest levels have been recorded in coastal locations, particularly adjacent to major urban centres. In such cases, they are comparable to those found in similar locations elsewhere in Australia and overseas.

4. Threat

- . None of the measured levels of any of the three contaminant groups pose a known threat to the integrity or functioning of the GBR, nor to human health, in the short term.
- . Longer term threats which these contaminants may pose to the reef are considered to be low at this stage. However, participants agree that the situation with respect to each group needs to be monitored and supplementary research conducted on related matters such as the ecotoxicological effects of sub-lethal concentrations, bio-accumulation and pathway processes before any long-term threat to the stability or integrity of the GBR from local or global sources can be fully discounted.

5. Information deficiencies

- . The ecotoxicological effects of sub-lethal concentrations of compounds within each contaminant group require further investigation particularly in relation to major processes such as reproduction and photosynthesis.
- . Research into the processes of contaminant mobilisation, entry, movement and accumulation within the GBR system is also required.
- . While it is possible to define the likely origin of most contaminants in the GBR Region, further information is needed on the extent and location of contaminant use, amounts of contaminants used and pathways to the GBR (particularly less well understood processes, such as atmospheric entrainment and fallout).
- . Some further attention needs to be given to contaminant levels in more remote areas of the GBR such as the Far Northern Section of the GBRMP and the Swains Reef complex.

6. Further Research

Major areas for further research effort which were identified by participants with respect to the three contaminant groups considered are:

- . Ecotoxicological effects of sub-lethal concentrations.
- . A need to focus on "hot spots" (i.e. specific areas and/or events of pollutant concern) for monitoring purposes.
- . The potential for using agreed indicator species.
- . The use of organochlorine pesticides in mainland agriculture.
- . Microbiological processes in anoxic conditions.
- . Disaster control and containment (or other response, as appropriate in the event of e.g., an oil spill).

A number of more general points which were raised in the open-forum discussion which are relevant to further research needs included:

- . The possibility of using predictive models as an alternative to monitoring. This was debated, however, on the grounds that it would require more information than is currently available, and in addition, it would often not reveal a perturbation until after it had occurred (in which case a management response may be too late). An alternative proposal supported by most participants, is to link predictive models with a systems approach and monitor localities from where a change in the system may be induced and/or target species/systems which may rapidly indicate or respond to environmental change.
- . The potential for using selected organisms either for monitoring purposes or as stress indicators, or both. The potential use of clams (*Tridacna* spp.) is already under investigation, although further research into their suitability is considered necessary. There was also a suggestion that a much wider range of organisms (e.g. bacteria) could be used

- . In order to avoid reactive management of contaminant-related problems, the Authority was advised to anticipate likely problem areas ("hot spots"). Participants were told this is already done to a large extent, but could be improved through closer inter-agency cooperation.
- . A dichotomy between scientific information needs and management information needs in the GBR Region was drawn. While the different objectives of both were recognised by most participants, there was general agreement on the need for close coordination and integration of both, where possible.
- . The means of enforcing any necessary pollution controls were questioned. Participants noted that effective control requires close cooperation between Queensland agencies and the Authority.