Intergovernmental Oceanographic Commission
Reports of Meetings of Experts and Equivalent Bodies

Panel for Integrated Coastal Observation (PICO-II)

Second Session
24-26 February 2009
Perth, Australia

GOOS Report No. 180

UNESCO

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ABSTRACT

The second session of the Panel for Integrated Coastal Observation (PICO) was held in Paris, France on 10-11 April 2008. The aim of the second session was to advance the development of a Prioritized Action Plan for Implementation of the Coastal Module of GOOS. Action plans and recommendations from the meeting are summarized in the report.

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BACKGROUND AND OPENING

ANNEXES

1. OPENING

Paul DiGiacomo welcomed participants and expressed his thanks to the sponsors and local organizing committee chaired by Nick D'Adamo (IOC Perth Office) for their preparations in advance of the meeting.

1.1 REVIEW AND UPDATE OF PICO-I MEETING AND FOLLOW-ON ACTIVITIES

Paul DiGiacomo reviewed actions from the first session of PICO (10-11 April 2008; Paris; GOOS Report No 172). Annex III provides a summary status on actions.

1.2 PRIORITIES AND EXPECTATIONS FOR PICO-II

This topic was presented under item 1.1. Paul DiGiacomo stressed the main priority was to advance the development of a Prioritized Action Plan for Implementation of the Coastal Module of GOOS.

2. DEVELOPMENT OF A PRIORITIZED IMPLEMENTATION PLAN FOR THE COASTAL MODULE OF GOOS

2.1 SUMMARY OF THE RECOMMENDATIONS IN THE IMPLEMENTATION STRATEGY FOR THE COASTAL MODULE OF GOOS

Tom Malone (former co-chair of the Coastal Ocean Observations Panel [COOP]) provided an overview of the Implementation Strategy for the Coastal Module of GOOS developed by the COOP (GOOS Report No. 148). Tom Malone's presentation is available at: http://www.ioc-goos.org/index.php?option=com_oe&task=viewDocumentRecord&docID=3589

One of the tasks for PICO is to prepare an Action Plan Implementation of a sustained Global Coastal Network. The stages for doing this will be set by reviewing, updating and integrating actions and recommendations from the Implementation Strategy and the IGOS Coastal Theme documents. The key steps include using priorities from GOOS Regional Alliances and reviewing the COOP provisional common variables with due consideration of quantitative indicators of ecosystem health.

With respect to development of a Coastal GOOS Action Plan for Implementation then there are some questions and issues that need reflection. For example should the plan include: (i) a phased implementation with time lines, milestones & cost estimates; (ii) mechanisms for implementation including funding sources; (iii) identification of responsible bodies for oversight and implementation? Further how can the Coastal module of GOOS collaborate more effectively with other organizations to: (i) make sure that the plan builds on, enhances or leverages existing activities; (ii) effectively engage additional expertise, user groups, & implementing bodies; and (iii) facilitate a clear and effective linkage between the Action Plan for Implementation and the actual implementation?

Some highlights of the more than 50 recommendations listed in the Implementation Strategy for the Coastal Module of GOOS were provided from seven categories (i) Governance; (ii) Observations; (iii) Data Management; (iv) Modeling & Analysis; (v) Capacity Building; (vi) Pilot Projects and (vii) Performance Evaluation.

Concluding his presentation Tom Malone raised the following issues for discussion:

Many of the recommendations in Implementation Strategy for the Coastal Module of GOOS go beyond the provision of sound scientific & technical advice, e.g., is the establishment of the Working Groups under a GOOS Regional Council realistic? What are the alternatives?

Are there "low hanging fruit" in the recommendations? What's realistic? What needs to be modified or dropped? What's missing?

Finally how can GOOS more effectively link planning to implementation? Should PICO meet in conjunction w/ GOOS Regional Forums rather that w/ the GSSC?

Following the discussion the panel concluded that the Action Plan for Implementation has to build on existing/ongoing work with respect to science and operations. Implementation has to focus on a few tangible things for the short term. It was recommended to develop the plan as packages rather than aiming for a fully integrated plan. The plan should highlight how existing activities that are carried globally or by the GOOS Regional Alliance, if augmented or combined with other measurements, can produce new products or address other phenomena of interest. Finally the plan has to be targeted well beyond the scientific community.

2.2 SUMMARY OF THE RECOMMENDATIONS IN THE IGOS COASTAL THEME

The aim of the Integrated Global Observing Strategy (IGOS) was to provide a comprehensive framework to harmonize the common interests of the major space-based and in-situ systems for global observation of the Earth. A Coastal Theme Report was developed under IGOS and subsequently published in 2006 (see IOC INF-1220; http://unesdoc.unesco.org/images/0014/001458/145874e.pdf).

Paul DiGiacomo provided an overview of the Coastal Theme report and recommendations. His presentation is available at: http://www.ioc-goos.org/index.php?option=com_oe&task=viewDocumentRecord&docID=3591.

The IGOS has been incorporated into GEOSS and the IGOS Coastal Theme process has been continued through the GEO Coastal Zone Community of Practice (CZCP; see also http://www.czcp.org/). The GEO CZCP offers PICO one way to interact with user and practitioners in the coastal zone. The CZCP has been convening workshops on coastal issues and the next one will take place in Cotonou, Benin (February 15-18, 2010).

The Panel questioned how effectively the CZCP can engage with the coastal GOOS community. GOOS Regional Alliances are seen to be the primary vehicles for interacting with the Coastal GOOS community.

2.3 REPORT ON GRA PRIORITIES AND REGIONAL UPDATES

Jose Muelbert (Co-Chair of PICO) presented results of a survey carried out among GOOS Regional Alliances. The presentation is available at: http://www.ioc-goos.org/index.php?option=com_oe&task=viewDocumentRecord&docID=3593

The first session of PICO recommended that the GRAs and PICO review the Implementation Strategy for the Coastal Module of GOOS Report 148 and that the PICO should assemble information on ongoing GRA projects and programmes. A questionnaire was developed by Jose Muelbert and circulated to the GRAs. Partial responses were received.

The survey was focused on the recommendations from the seven chapters of the COOP Implementation Strategy (GOOS Report 148) including (i) Governance; (ii) Observations; (iii) Data Management; (iv) Modeling & Analysis; (v) Capacity Building; (vi) Pilot Projects; and (vii) Performance Evaluation. Within each of the seven areas/topics the survey tried to uncover (i) how the recommendations from the COOP Implementation Strategy are addressed at the GRA level; (ii) what are the highest priorities with that area/topic at the GRA level; and (iii) what is needed to advance implementation within that area/topic at the GRA level.

[This paragraph is based on the summary provided in the Report from the 11th Session of the GSSC GOOS Report No. 175] Brief summary recommendations and advice on the seven topics were:

(i) Governance: A GRA users' forum and GRA Steering Committee should be established to facilitate improved communications. The Fourth GRA Forum appears to have initialized these actions.

(ii) Implementing Measurement Subsystem: Highest priority is review of common variables and standards, and database of national and regional observation systems.

(iii) Implementing the Data Management Subsystem: Working with IODE and Data Management clusters to determine metadata content and develop web services. Need to adopt top down international standards, which are already available.

(iv) Modeling and Analysis Subsystem: developing community modeling networks and regional modeling capability.

(v) Developing and improving capacity: no systematic coastal programme has been established. Identified a need to implement operate and improve coastal networks.

(vi) Pilot Projects: pilot projects are preferred route for progress in some regions. They can be used to usefully build operational and forecasting capacity in less developed regions.

(vii) Performance Evaluation: Need for procedures for periodically assessing and updating common variables, intercalibration activities and standards and protocols. The GSSC has a role to move forward the establishment of interregional programmes for progress on many of these themes. The diversity of GRAs in nature and activities makes these inter-regional and top-down actions difficult to assess and manage. Expectancy regarding implementation is not the same within GRAs and between GRAs and advisory bodies. The lack of the "GOOS framework" appears evident and limiting implementation in many GRAs. An assumption of successful implementation is the existence and effectiveness of the GOOS Regional Council.

2.4 REVISITING COMMON VARIABLES AND QUANTITATIVE INDICATORS

Tom Malone introduced this agenda item. He touched on two topics: (i) indicators for assessment of current and future ecosystem states; and (ii) the provisional list of common measurement variables as proposed in the Implementation Strategy for the Coastal Module of GOOS (GOOS Report No 148). The presentation is available at: http://www.ioc-goos.org/index.php?option=com_oe&task=viewDocumentRecord&docID=3590

Formulation and effective implementation of such approaches require (1) scientifically credible, quantitative, robust, cost-effective and validated indicators that can be used to assess and anticipate changes in the status of marine ecosystem goods and services; and (2) sustained observations and modeling that enable these indicators to be monitored and analyzed routinely at rates most useful to policy and decision makers responsible for sustainable use of these goods and services.

The Driver-Pressure-State-Impact-Response model can provide a framework for identifying a set of indicators. There have been many studies to determine essential indicators. However, most

indicators for marine systems are for tracking state changes; few, if any, are useful for making predictions; the determination of reference points is a major challenge; few indicators are operational – most are used for research; and suites of indicators will be needed. Moreover indicators must also be: (i) credible; (ii) easy to understand; (iii) useful for comparative analyses; (iv) useful for assessing the impacts of policy and management decisions; (v) easy to compute repeatedly, at rates required for effective decision making; (vi) based on quality assured data; and (vii) must be cost-effective.

However, routine, timely, quantitative, continuous assessments of coastal ecosystems are not possible at this time. Some of the reasons are: (i) lack of sustained observations of key environmental variables; (ii) under sampling; (iii) lack of rapid, near–real time data acquisition and analysis; and (iv) lack of data assimilation for biological and chemical variables.

Possible actions for PICO include: (i) update the COOP list of external drivers of the phenomena of interest; (ii) identify the parameters of internal dynamics for each potential ecosystem state; (iii) specify standards for indicators and procedures for international adoption of them; (iv) recommend a minimal suite of indicators needed to track and predict changes in ecosystem state; (v) assess the value of indicators to scientists, policy makers and managers; and (vi) develop coastal GOOS to provide data and information required to calculate indicators.

Concerning the common measurement variables for the global coastal network as proposed by the Coastal Ocean Observations Panel in GOOS Report 125 and 148, then COOP began by:

(1) identifying phenomena of interest for each of the societal goals of GOOS and

(2) user groups that would benefit from GOOS data and information, i.e., those who use, depend on, manage and study marine systems common measurement variables as proposed. Details of the selection process are provided in GOOS Report 125 and 148.

The result of the selection process established a list of the provisional common variables including geophysical variables (temperature, salinity, currents, waves, sea level, shoreline position, bathymetry), chemical variables (dissolved inorganic nutrients, dissolved oxygen, pCO2, pH), biological variables (faecal indicators, phytoplankton biomass, benthic biomass), and biophysical variables (bio-optical properties).

In regards to the common measurement variables then the possible actions for PICO could be to review and update the Provisional Common Variables. This review should take into consideration: (i) the advancement in knowledge since the Coastal GOOS Implementation Strategy (GOOS Report No. 148) was published, e.g. acidification of the ocean and “fishing in balance”-index; (ii) advances in technology, e.g., ECO Pucks (bio-optical sensors), nitrate sensors, gliders and the Global Ocean Tracking Network; (iii) transition of research models to operational use, e.g., HYCOM, ROMS, POM, BLUElink-OceanMAPS; (iv) Capacity Building Successes, e.g., POGO – SCOR Visiting Fellowship Programme for Oceanographic Observations and IOCCG – Ocean Color Training; and (v) new priorities, e.g., provision of the required data & information for indicators of ecosystem states & future states

2.5 REVIEW OF PICO-I ACTION “DEVELOP A CONCEPTUAL PLAN FOR A GLOBAL COASTAL NETWORK/COASTAL SYSTEM OF SYSTEMS”

John Parslow presented this agenda item. The presentations is available at: http://www.ioc-goos.org/index.php?option=com_oe&task=viewDocumentRecord&docID=3588

PICO exists to support the GSSC in implementing the coastal GOOS strategy. The strategy recommended the expansion of the GSSC to include coastal experts. On-ground implementation is expected to be largely achieved by GRAs and National GOOS bodies, through ROOS, but also through pilot projects. The strategy includes a large number of Recommendations/Action Items. Some are directed at GSSC. Many are directed at the four proposed Working Groups to be set up by GRAs and the GOOS Regional Council (See GOOS Report 148).

The Coastal GOOS Implementation Strategy (GOOS Report 148) is considered and phased, but also ambitious in scope. General calls for GOOS plans to be pragmatic, realistic, prioritized, focused on feasible initiatives delivering tangible and direct benefits. GOOS focus on end-to-end delivery: observations, analysis, products, dissemination, and user uptake. The strategy identifies some examples which are underway and partially complete e.g. tsunami warning, storm surge, etc. Potential to have some ambitious pilot projects (like GODAE), but not many. An action plan for implementation should (ideally) lay out actions and tasks, responsibilities, timelines, costs, benefits and beneficiaries.

Implementation of the Coastal Module of GOOS will largely rely on GRAs and ROOSes. Coastal GOOS will largely be a sum of the individual GRA plans. PICO can influence and support regional plans. GRAs are charged with building user groups, and documenting existing observing systems. Any plan has to be jointly owned by GRAs.

Some questions remain: Is the Global Coastal Network an intersection or sum of ROOSes. Common core variables – which variables, sampling design? Remote sensing and calibration and validation. Role of sentinel / reference stations – what is the global analysis and product? What role for existing global initiatives e.g. coral reefs, seagrass, HABs. Role for GCN in upscaling and in downscaling.

Regional / local pilot projects vs global pilot projects. Is there a “banner” pilot project comparable to GODAE for the coast? However, (i) coasts are more complicated; (ii) there could be many potential pilot projects; and (iii) many pilot projects have their own communities, backers, and momentum.

Standards, protocols, communities of practice are potentially some of the most powerful ways to get integration across GRAs. The existing strategy documents (GOOS Report 125 and 148) assign this role to Working Groups. Action Plan for Implementation of Coastal GOOS will need to address this.

The role of PICO is that it acts as an arm of GSSC. PICO does not have command and control, or funds available. GOOS has a very complex implementation structure, with many GRAs and ROOS, all with their own goals, priorities, plans, politics. PICO can try to make an informed assessment of what the sum of these plans is likely to produce, where there are gaps, synergies, opportunities. In this context PICO can make recommendations and suggestions to the GRC and GSSC.

The Panel agreed that a bottom up approach for building the Global Core Network would likely be most useful. The Panel further agreed that it would be most optimal to focus the action plan on themes or issues and then work backwards on to what is needed in terms of products and observations.

2.6 ARTICULATION OF IMPLEMENTATION PLAN PURPOSE, STRUCTURE, CONTENT, PRIORITIES AND OUTLINE WITH WRITING ASSIGNMENTS

Paul DiGiacomo presented a draft table with a small representative set of phenomena of interest. This table would serve as a method to work backwards from to identify (i) users; (ii) products/indicators; (iii) needed observations; (iv) models and analysis systems; (v) providers; (vi) maturity; (vii) potential pilot project; and (viii) implementers.

Phenomena of Interest	Users	Products/ Indicators	Observations Sat & in situ (Needs & Gaps)	Modeling & Analysis (Needs & Gaps)	Providers (and/or community of practice or practitioners)	Maturity Status: Operational or R&D (strategic investment opps to advance?)	Capacity building	Pilot Projects	Implementers
Coastal flooding									
Habitat modification and loss									
Ocean Acidification									
Increasing abundance of pathogens									
Euthropication – hypoxia									
Abundance of exploitable Living Marine Resources									

3. DEVELOPING AND FACILITATING EXTERNAL LINKAGES AND ACTIVITIES

3.1 BRIDGE IMPLEMENTATION PLANNING: LINKING THE OPEN OCEAN AND COASTAL MODULES OF GOOS

[This agenda item was not discussed]

3.2 OCEANWATCH: A POTENTIAL GLOBAL OCEAN REMOTE SENSING INITIATIVE

[This agenda item was not discussed]

4. SUMMARY, RECOMMENDATIONS AND ACTION ITEMS

4.1 DISCUSSION OF EXTERNAL LINKAGES IN CONTEXT OF IMPLEMENTATION PLAN ACTIVITIES AND PRIORITIES

[This agenda item was not discussed]

4.2 FINALIZE IMPLEMENTATION PLAN DRAFT OUTLINE AND WRITING ASSIGNMENTS

Paul DiGiacomo provided an outline of a prioritized and phased Coastal GOOS Action Plan for Implementation. Following discussions the Panel agreed to the outline provided in Annex IV.

4.3 REVIEW OF PICO-II ACTIONS AND SCHEDULE

Paul DiGiacomo summarized the actions stemming from the PICO II meeting. The actions are tabled in Annex V.

4.4 REVIEW GSSC ISSUES

The Panel discussed issues and actions that should be reported to the GOOS Scientific and Technical Steering Committee (GSSC). These were (i) to explore PICO-GODAE/OceanView Linkages – focusing on coastal zones and ecosystems; (ii) to explore with GEF on possible financial support for PICO; (iii) to continue dialogue with LMEs (and other potential partners); (iv) to consider if the present meeting strategy is optimal (i.e. holding PICO and GSSC meetings back-to-back versus having PICO meet back-to-back with the GRA Forum); and (v) to recommend that the GSSC nominate GOOS representatives to GEOSS Committees (Science and Technology, Capacity Building and Architecture and Data Committee).

5. & 6. JOINT SESSION BETWEEN THE GSSC AND PICO

Agenda items 5 and 6 were discussed in a joint session between PICO and the GSSC on Friday (Friday 27 February 2009). These items are reported on in the summary report from the 12th session of the GSSC [GOOS Report No. 175)]).

7. CLOSURE AND NEXT MEETING

Paul DiGiacomo and Jose Muelbert thanked the panel members for their participation and good work during the session. The PICO meeting was closed on Friday 26 February at 17:30. The next meeting of PICO will take place back-to-back with the GGSC in London from 8-12 March 2010.

ANNEX I

AGENDA

Provisional Agenda for the Second Session of the Panel for Integrated Coastal Observations (PICO-II), 24 - 26 February 2009, Perth, Australia (Version 17 February 2009)

Tuesday 24 February 2009

1. OPENING

1.1 Review and Update of PICO-I Meeting and Follow-on Activities (P. DiGiacomo & J. Muelbert)

1.2 Priorities and Expectations for PICO-II (P. DiGiacomo & J. Muelbert)

2. DEVELOPMENT OF A *PRIORITIZED* IMPLEMENTATION PLAN FOR THE COASTAL MODULE OF GOOS

2.1 Summary of the recommendations in the Implementation Strategy for the Coastal Module of GOOS (T. Malone)

2.2 Summary of the recommendations in the IGOS Coastal Theme (P. DiGiacomo)

2.3 Report on GRA Priorities and regional updates (J. Muelbert)

2.4 Revisiting common variables and quantitative indicators (T. Malone)

2.5 Review of PICO-I action "Develop a conceptual plan for a global coastal network/coastal system of systems…." and draft outline distributed with agenda (J. Parslow)

2.6 Articulation of Implementation Plan purpose, structure, content, priorities and outline with writing assignments (Group, facilitated by Co-Chairs)

Wednesday 25 February 2009

2. DEVELOPMENT OF A *PRIORITIZED* IMPLEMENTATION PLAN FOR THE COASTAL MODULE OF GOOS (CONTINUED)

2.6 Articulation of Implementation Plan purpose, structure, content, priorities and outline with writing assignments (Group, facilitated by Co-Chairs) - *continued*

Thursday 26 February 2009

3. DEVELOPING AND FACILITATING EXTERNAL LINKAGES AND ACTIVITIES

3.1 Bridge Implementation Planning: Linking the Open Ocean and Coastal Modules of GOOS (Group discussion or WG, led by OOPC Chair and PICO Co-Chairs)

3.2 OceanWatch: A potential global ocean remote sensing initiative (P. DiGiacomo)

4. SUMMARY, RECOMMENDATIONS AND ACTION ITEMS

4.1 Discussion of external linkages in context of Implementation Plan activities and priorities (Group led by Co-Chairs)

4.2 Finalize Implementation Plan draft outline and writing assignments

4.3 Review of PICO-II Actions and Schedule

13:30 – 15:00

5. JOINT SESSION BETWEEN GSSC AND PICO

5.1 GODAE OceanView - Andreas Schiller

5.2 Large Marine Ecosystems, Paul Digiacomo PICO co-chair

5.3 Report from PICO

5.4 Report of the Workshop. Nick D'Adamo

15:30 – 17:30

6. JOINT SESSION BETWEEN GSSC AND PICO

Working Groups 3:5

WG3: Interaction of GOOS, GSSC, I-GOOS with the GEO/GEOSS.

WG4: GODAE OceanView within the GOOS Structure. Discussion of proposal and Terms of Reference.

WG5: Develop theme of the Workshop into a GSSC and/or PICO perspective. Outline and assign the writing assignments for the Workshop report, paying attention to needs of GSSC and PICO.

ANNEX II
LIST OF PARTICIPANTS

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ANNEX III

Progress on action items from PICO-I

Item	Due Date	By Whom	Remarks
Coastal System of Systems			
Develop a conceptual plan for a global coastal network/system of systems, integrating it with regional pilot projects (observations, models, pilot projects, information delivery mechanisms et al.); then work this issue collaboratively with GRAs at the 4th GRA Regional Forum		Tom Malone and John Parslow; group	Tom and John produced document. Presented at GRA Forum
Identify, collate, review and identify key ecological indicators (millennium assessment, and s) of coastal (GOOS) relevance, and associated variables needed for this		Jose Muelbert, Helen Yap, Tom Malone	Tom leads Heinz center
Identify the driving legal mandates under conventions to demonstrate observation needs. Use these to identify near-term observing requirements, focus on those and use to prioritize variables and observing priorities as below to drive implementation (Thorkild Aarup to provide UNEP inventory of conventions)		Thorkild Aarup, Paul DiGiacomo and Neville Sweijd	Sent out inventory. No additional global convention. Mentioned Global Assessment and how that will drive requirements for observations. 471 assessments exist
Revisit and update provisional GCN common variables and take to GRAs (e.g, pH); identify 5-6 variables to focus on (possibly some variables can be remotely sensed). Then phased implementation of others into GCN		John Parslow and Tom Malone	Not much progress
Continue to engage LMEs; encourage cross-LME interactions (standards), and explore working with GEF to encourage countries to implement LMEs and have workshops to discuss common/best practices, targeted research and development and capacity building needs across LMEs; recommend high level meeting between IOC and International Waters Programme of GEF (Al Duda) –		Neville Sweijd, Bruno Blanke, Paul DiGiacomo	LME presentation at the GRA Forum. Value opportunities to work with GRAs and LMEs. For some GRAs there are great potential for collaborations. BCLME has transitioned to a Beguella Current Commision. ASC

Paul DiGiacomo to contact Ned Cyr and Ken Sherman/NOAA			LME more complex – very fisheries oriented. Ned Cyrs presentation was well taken at the GRA Forum. Some GRAs don't know much about LMEs. Perhaps talk with Al Duda.
Endorse GSSC breakout recommendation for a model survey and intercomparison activity and use these findings to articulate priorities for basin-scale/regional development and implementation activities		Co-chairs, then Tetsuo Yanagi, Bruno Blanke and John Parslow to review	No progress
Develop plan to effectively link and couple basin-scale with coastal observations (seasonal to short-term physical forecasts); facilitate planning and development of CODAE (basin/shelf) as well as CODAS (catchment/coastal coupling) – also addressing mesoscale atmospheric observations and their assimilation – possible contact Pierre-Yves Le Traon (CLS, Tolouse, France)		John Parslow, Paul DiGiacomo and Ed Harrison	Ongoing conversations
Formulate a set of questions to take to the steering committee for the final GODAE symposium – meeting in June 2008 - coordinating basin with regional scale observations, processes and dynamics		John Parslow, Paul DiGiacomo and Ed Harrison	
Reviewing and updating requirements in IGOS Coastal theme and how to tune to specific applications/products		Co-chairs/Group	No specific call for actions. No explicit. Incorporate with review of common variables
Regional GOOS/GRAs			
Review pilot projects identified by GRAs during 3rd GRA Forum that can conform to criteria identified by GSSC Breakout Group #4 (including IEEE criteria)		Co-chairs/Group	No progress
Working with participating countries, IOC Regional Offices		GRAs/IOC Offices then	Still open. Ongoing process with GRAs

and GRAs, create and maintain an updated inventory and characterization of current activities that should be considered for endorsement as a contribution to implementation of the coastal module of GOOS; some previous activities (19 countries reported per previous IOC call) – PICO will review and assess relative to conceptual framework		group	and very slow. Should be followed up.
Plan/organize PICO meetings/workshops within GRAs		Co-chairs	Helped flush out agenda for IVth GRA Forum
Recommend to GSSC that the GOOS Regional Council create an inter-GRA web-site/clearinghouse to provide overview of regional observing activities and promote coordination/integration of their activities		Co-chairs	No progress. To be carried forward and flagged to GSSC
Review and update requirements in IGOS Coastal theme and how to adapt them to specific applications/products		Co-chairs/Group	
Mechanisms: coordination of existing activities, pilot projects, workshops and capacity building			
Develop pilot project on remote sensing of shallow water/benthic ecosystems (coral reefs, sea grass beds, mangroves, wetlands, estuaries) - extent and condition, quality, health, coupled with in situ observations – formulate common standards, protocols, approaches; refine requirements from IGOS Coastal Theme Report		Helen Yap; Tetsuo Yanagi	Asean –Japan (JSPS funded) pilot project (check with Tesuo). There have been some discussion with GEOSS. WESTPAC Coasatl WESTPAC. Helen suggested that this action should more be interpreted as “facilitate” and to get to the many various projects of this kind.
Pursue development of high resolution nearshore bathymetry/topography product – also supports improved hydrodynamic modeling; toward supporting improved coastal hazard risk assessments and mitigation		John Parslow and Paul DiGiacomo	Same as above

efforts vis-a-vis inundation, flooding, erosion. Paul DiGiacomo to bring to the GEOSS workshop Observing System Requirements for Managing and Mitigating the Impacts of Human Activities and Coastal Inundation in the Mediterranean Region (9-13 June 2008, Athens, Greece)			
PICO nominates Tetsuo Yanagi and Tom Malone to represent GOOS on the Joint IPHAB-GSSC Task Team on HABs		Co-chairs	Done. But no action
Pursue development of Water Quality Remote Sensing Pilot Project – responsive to "Land-based sources of marine pollution and run-off" – pursue in conjunction with efforts in developed nations (e.g., Australia – John Parslow; Jose Muelbert - also efforts in Brazil). Neville Sweijd Ecological Geography of the Sea noted project (RIBBS – River influencing Bights and Bays) spinning up in South Africa – Natal region – need to coordinate efforts. Africa has been identified by I-GOOS as primary region for pilot projects….		Co-chairs; Neville Sweijd, and John Parslow	How do we enhance, coordinate and facilitate.
Articulate during the intersession pilots involving wind-wave-current interactions (e.g., coastal erosion, spills/fate and transport, search and rescue, port/maritime operations)		Group	
Bruno Blanke will report back from upwelling symposium – potential pilot efforts on comparative analyses/atlas/time series/typologies of coastal ecosystems – develop/use of advanced indicators to track changes in systems over time. also need to review what has already been done (i.e. consult with Alan Longhurst book Ecological Geography of the Sea)		Bruno Blanke, then group potentially	Bruno Blanke did send a report
Recommend GSSC designate GOOS representative to serve on GEO Capacity Building Committee		Co-chairs	Not done yet. Also name a contact to the GEOSS ASC

Need to enhance linkages/coordination with LOICZ, especially in capacity building (also in area of socio-economic indicators) – Paul DiGiacomo to contact Jozef Pacyna (Chair of LOICZ)		Co-chairs; John Parslow /Tetsuo Yanagi	John reported that there are relevant projects on for instance coastal vulnerability. Not much done
Review capacity building documents/initiatives and identify linkages for PICO		Thorkild Aarup and Jose Muelbert	Not much done. Tom mentioned that we should not limit ourselves to IOC or JCOMM capacity building. POGO, START, IOCCG should be solicited
Other			
Implement IPHAB-GSSC joint task team on HABs		Tom Malone	Proposal was floated using remote sensing but
Provide panel details on GRA composition, process, websites et al.; PICO website?		Thorkild Aarup	Done
PICO to send representative to next OOPC meeting in Argentina (Jose)		Co-chairs	Jose attended. Next OOPC meeting will focus on OCEANOPS.
Revisit issue of performance measures/metrics, progress indicator etc.		Group; tabled for now	Needs to be addressed
Contact Ralph Rayner (Chair elect of the GSSC) re. outreach/coordination		Paul DiGiacomo	Needs to be continued
Consideration of other (than SST) Coral bleaching observations/indicators – end to end system for coral bleaching (GEO community of practice…)/GEF initiative on coral bleaching		Group ?	Needs to be further facilitated

ANNEX IV

Chapter Outline/Schedule for the PICO-Coastal GOOS Implementation Plan

Outline

1) Background (and Vision) – Jose Muelbert and Paul DiGiacomo

2) Phenomena of interest (all as previously identified) and *types of users* with mapped, user-driven products/indicators - Tom Malone

3) Building end to end system for initial subset (6) of the above Phenomena of Interest – Group as below

   End to end components of the observing system(s) needed to address each phenomena/indicator (categories to address per table revised by Tom Malone), focusing on follow initial subset of *phenomena of interest (PoI)*:

   Coastal Flooding Events: Tom Malone and Thorkild Aarup
   Increasing abundance of pathogens: Tom Malone and Paul DiGiacomo
   Ocean Acidification: Paul DiGiacomo, Jose Muelbert and John Parlow
   Habitat modification and loss: Helen Yap and Tetsuo Yanagi
   Euthropication – hypoxia: John Parslow and Tetsuo Yanagi
   Abundance of exploitable Living Marine Resources: Neville Sweijd and Helen Yap

4) Cross-cuts from #3 above looking for commonalities– common measurement/modeling technologies/approaches as well as observations and common variables that recur across #3 above – Specific assignment to wait for completion of 1-3 above.

5) Integrated system of systems/schemes from #3 and #4 above (i.e., not isolated approach) – Specific assignment to wait for completion of 1-3 above.

   There are many interactions/dependencies/feedback/synergies; risks with independent development efforts; likewise value-added of integration. Need especially to address upscaling and downscaling issues – e.g., how is what you do locally depend upon what is happening around you (up to globally); what do you need to have to be able to address global issues?

   a. Integrated (end to end) system of systems
   b. Relation between regional and global – scaling issues (and relation to "a" above)

6) Build-out Plan

   a. Phased prioritized build-out plan

   What do we (realistically) expect to have happen when and where, timetable, performance measures, milestones and "cost" estimates (rules of thumb approach – certain %'s based on observing system investments) et al. Perhaps separate phased build out plan for both 5a and 5b above; potentially further differentiated as below:

   1st phase what's ready to go now (what exists now and also what will be definitely functioning in say 5 years time – Operational, Pre-Operational, R&D)

2nd phase - technology ready but needs to be infused into operational systems

- technology available/has been through research/pilot project phase and implemented in some places but needs to be transferred to build user capacity (especially in developing nations)

3rd phase need technology/R&D investments and activities

We can potentially consider different tiers/options (conservative to ambitious): what will happen regardless if nothing new done (based on existing plans) to more ambitious planning levels where funding/intervention needed to move forward – there are many dependencies (likewise value-added from integration) also address fit for purpose and reality; cost-benefit relationships.

b. Pilot Projects

What pilot projects and/or R&D efforts needed to advance capabilities described above; toolkits?

c. Responsible bodies for advisory, oversight and implementation

Which GRAs/WGs/CoPs/Centres will accomplish which issues etc – implementing organizations/bodies et al. (role of GRC in all this)

d. Funding Mechanisms and Community Partnerships

Mechanisms for implementation including funding source? (engage GEF et al.?)

Build on/leverage existing community efforts, engage other community partners etc.

Note: The plan also needs to articulate/specify linkage with the Global Marine Assessment of Assessments

***Schedule**:*

1) First, generate initial annotated outline of plan with updated list of Phenomena of Interest (but focusing on subset of six as above to start; this a living document - revisit others later, noting this represents a phased implementation approach).

   Action: ~3-5 page- planning document by May 15th; submit to GSSC for feedback

2) Then, go to GRAs (and perhaps other select partners) with early version of this plan (early drafts of chapters 1, 2, 3 to start and brief outline for rest of chapters, only focus initially on 6 "priority" PoI (each GRA should hopefully have at least 1-2 that they like), have end to end system elements/components somewhat fleshed out, with notion of phased implementation – just going for feedback that we are on the right track (not approval to proceed, and just GRA Chair/Leader opinion) and get early buy-in and build consensus and then get fully fleshed out afterwards per below.

   Action: Send expanded draft document as above to GRAs et al. by end July 2009

3) Get feedback per above by say September (submit to GRAs in July allowing 1-2 months reply time, perhaps with additional OceanObs 09, CZCP workshops feedback in August/September time frame). Set information cut-off of early October (post OceanObs '09). Proceed with full blown plan – doing complete end to end analyses for subset of 6 PoI, including now cross-cut analyses (Chapter 4), system of systems analyses (Chapter 5), then priorities/implementation (Chapter 6) etc.

   Action: complete internal draft by mid-January 2010, then iterated version by mid-February 2010 (posted in advance next GSSC meeting)

4) Circulate draft to interested parties (GRAs et al.) in March 2010, then subsequent broader community review.

   Action: complete final plan for initial 6 Phenomena of Interest by end of 2010, then final version to GSSC in 2011.

ANNEX V

PICO-II Actions

Short-Term:

1.1 Send out URL and other information regarding Global Assessment of Assessments – Thorkild (Completed)

1.2 Reach out to IPCC WG #2 – Chairs

1.3 Contact GRAs about mandates/drivers within their region; make this part of follow up to questionnaire; also send out responses received to date to other GRAs - Jose

1.4 OceanObs '09 White papers:
a. Tom Malone on PICO Action Plan
b. Jose Muelbert and Paul DiGiacomo Coastal Observing Systems
c. Paul DiGiacomo and Jose Muelbert on Coastal Biological Observations
(note: likely we can only realistically do either "b" or "c", not both….)

1.5 CZCP Workshops in Africa – Neville Sweijd to provide linkage (and Paul DiGiacomo to lesser extent)

1.6 Determine optimal GSSC/PICO Meeting strategy - GSSC Chair and PICO Chairs

Mid-Term/Ongoing:

2.1 Review and update IGOS coastal observing requirements as part of Action plan – Group led by Paul DiGiacomo/Jose Muelbert

2.2 GSSC – nominate GOOS member to GEOSS Committees (S&T, Capacity, ADC) – Chairs to work with Ralph Rayner

2.3 Explore LME follow up – work directly with regions – Neville Sweijd, Paul DiGiacomo/Ned Cyrs and Ralph Rayner

2.4 Continue dialogue with GEF, consider potential proposal submission – GSSC Chair and PICO Chairs

2.5 Liaise with LOICZ (coastal vulnerability et al.) and IMBER, make linkage/interface with Josef Pacyna, Hartwig Kremer, Julie Hall/ME Carr – John Pa and Paul

2.6 Further populate PICO home page – Group

2.7 Review GRA (and GEWEX et al.) strategic implementation plans, map onto Phenomena of Interest – Thorkild Aarup and Group (according to their own regional expertise); IOC Regional Offices

2.8 Cross-walk our priority Phenomena of Interest with other potential implementing partners – Group

2.9 Linkage with GODAE/CODAE (including performance measures/metrics; quantitative treatment of errors) - Chairs

2.10 Review and prioritize COOP Plan #148 Recommendations – Tom Malone will map recommendations to current outline

2.11 Identify user-driven products/indicators for the Phenomena of Interest - Group

2.12 Generate Draft Implementation Plan – Group (see accompanying Report Outline)

2.13 Schedule regular telecoms for Panel – Chairs and Thorkild Aarup

ANNEX VI

ACRONYMS

ChlorOGIN	Chlorophyll Global Integrated Network
CODAE	COastal Data Assimilation Experiment
CZCP	Coastal Zone Community of Practice
GCN	Global Coastal Network
GEF	Global Environment Facility
GEO	Group on Earth Observations
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
GRA	GOOS Regional Alliance
GSSC	GOOS Scientific Steering Committee
GTOS	Global Terrestrial Observing System Global
HAB	Harmful Algal Blooms
ICSU	International Council for Science
IEEE	Institute of Electrical and Electronics Engineers (USA)
IGOS	Integrated Global Observing Strategy
IMOS	Integrated Marine Observing System
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data and Information Exchange (IOC)
IPHAB	Intergovernmental Panel on Harmful Algal Blooms
J-PICO	Joint GOOS-GTOS Panel for Integrated Coastal Observations
LME	Large Marine Ecosystem
LOICZ	Land-Ocean Interaction in the Coastal Zone (IGBP)
NOAA	National Oceanic and Atmospheric Administration (USA)
OOPC	Ocean Observations Panel for Climate (GCOS-GOOS-WCRP)
PICO	Panel for Integrated Coastal Observation
POGO	Partnership for Observation of the Global Oceans
RIBBS	River influencing Bights and Bays (South Africa)
SAEON	South African Earth Observation Network
SCOR	Scientific Committee on Oceanic Research
SEIS	State of Ecosystem Information System
SST	Sea Surface Temperature
TOPP	Tagging of Pacific Predators
UNEP	United Nations Environment Programme
WMO	World Meteorological Organization