Integrating Adaptive Environmental Management into Dredging Projects

CEDA Position Paper March 2015
webinar January 2016 version

Gerard van Raalte
Boskalis Hydronamic
Definition - Adaptive Management

- decision framework facilitating flexible decision-making
- to be refined for future uncertainties, when understanding effect of current and future management actions.
- developing and implementing a management plan, defining project goals and periodically reviewing progress,
- in response to the outcomes of (environmental) monitoring, implementing corrective actions and refining of plan, as needed.
Why this CEDA paper?

• Projects often permitted, after EIA, with conditions and thresholds based on best understanding.
• Yet uncertainties exist about effects and responses by nature – better or worse.
• Need for less rigid management structure recognised.
• Gives information on objectives, suggestions and recommendations how to apply adaptive processes.
What is AM, and what can it deliver

- Decision framework for decision making in response to uncertainties, leading to AM plan, based on monitoring.
- Relatively formal process, towards high efficiency while aiming for good ecological state.
- 5 steps:
What is AM, and what can it deliver

<table>
<thead>
<tr>
<th>Project Consideration</th>
<th>Benefit</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>Enables a project with uncertainties to go ahead.</td>
<td>In rare instances, may be used as an “excuse” for poorly conceived design</td>
</tr>
<tr>
<td></td>
<td>Effective method of protection for the environment, especially when tiered</td>
<td>or project implementation. Dealing with uncertainties takes more time and</td>
</tr>
<tr>
<td></td>
<td>management approach.</td>
<td>effort.</td>
</tr>
<tr>
<td>Legal / Permitting</td>
<td>May allow projects to proceed with licence while still uncertainties on</td>
<td>May conflict with prevailing laws, when based on precautionary principle.</td>
</tr>
<tr>
<td></td>
<td>sensitive receivers.</td>
<td></td>
</tr>
<tr>
<td>Effort and economics</td>
<td>Case-specific solution with initially more effort, but possibly lower</td>
<td>Uncertainty on effort complicates exact advance budgeting. Needs allowance</td>
</tr>
<tr>
<td></td>
<td>total effort and cost.</td>
<td>for provisional funds. Might delay project.</td>
</tr>
<tr>
<td></td>
<td>High attention level advantageous for overall result.</td>
<td></td>
</tr>
<tr>
<td>Contractual</td>
<td>Allowance for flexibility reduces potential for conflicts.</td>
<td>Increased effort in contract management, for risk sharing</td>
</tr>
<tr>
<td>Social</td>
<td>Stakeholder trust may be improved by transparent process.</td>
<td>May be perceived to justify worse project outcomes. May be reluctance to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>reduce scope.</td>
</tr>
</tbody>
</table>
Implementing AM

Management considerations

• Not working from precautionary approach – worst case scenario
• Working on case-specific approach to less conservative scenario, focus on sensitivity of environmental receptors
• Management Organisation requires
  – temporary more intensive monitoring-evaluation-assessment
  – higher budget and resource requirements for MEA,
  – mechanism to deal with variable effort based on requirements,
  – mechanism to deal with changing total costs
  – cross-sectoral project management skills,
  – flexibility for a differing implementation timeframe
Implementing AM (continued)

Management considerations

• Management structure to be communicated openly
  – Specific thresholds for effect
  – Tiered levels for action
  – Monitoring methodology (including frequency)
  – Review process for adjustments
  – Required response times
  – Decision making process

• Defined in Adaptive Management Plan

• Early Contractor Involvement advised
Implementing AM (continued)

Tendering Procedures

• How to objectively select Contractor for ECI when scope not clear.
• Example procedure
Implementing AM (continued)

Legal aspects - Permits

• AM to comply with current law, possibly with combination of options.
• Uncertainty easily leads to precautionary conditions
• Role of Regulator to become more involved, if not pro-active
• Advisory Panel, with powers, could play important role in decision making, before and during implementation.
Critical success factors for AM

Adaptive Management Plan

• AMP with procedure for integrating AM during implementation phase
• Simplified example given.
Critical success factors for AM (continued)

Conditions

• Understanding baseline and natural variability
  – Essential (for any project)
  – For long term trends and variability

• Understanding sensitivity and setting triggers
  – Modeling to assist
  – Monitoring to inform
  – AM to adjust
Critical success factors for AM (continued)

Conditions

• Project-specific monitoring and analysis of data
  – In relation to aims of AM
  – Spatial / temporal / economic / environmental objectives
  – Transparency in data collection and processing
  – Distinguish natural events
  – Adjust program when appropriate

• Project-specific management responses
  – From simple (investigate) to extreme (stop)
  – Best in reaction to tiered trigger levels
Critical success factors for AM (continued)

Conditions

• Well defined roles and responsibilities
  – Project owner / developer responsible
  – Contractor to participate in monitoring
  – Contractor to sign-up to environmental objectives
  – (Moving towards Alliance)

• Effective review process
  – ‘slow’ monitoring to be followed by ‘quick’ decisions
  – No room for bureaucracy, pragmatism required
  – Assistance by Independent Review Panel
Case Study - Øresund Fixed Link (DK)

- Slow response on environmental receptors urged for management on spill budget.
- Contractor to monitor and responsible to manage project with SB
- Owner verifying response through feedback monitoring
- Within time / budget, no effects
Case Study – Wheatstone (AUS)

• Dredging for LNG port and pipeline trench
• Strict water quality control
• Contractor to monitor turbidity, manage works against triggers, using forecast modeling
• Owner monitoring benthic communities, reviewing trigger values, using hindcast modeling
Case Study – Poplar Island (US)

• Artificial Island in river used as storage area for dredged maintenance sediments
• Habitat restoration with AM: sequential filling and vegetation planting in cells.
• Monitoring of predicted effects, followed by adjustment of plans for next phase
• Facilitated environmental benefits with beneficial use of DM
Case Study – Lumut (Malaysia)

• Dredging with 14 km silt curtain at 25 m water with 3m waves as per conservative EIA

• Execution by large TSHD and extensive plume monitoring, no silt screen; good information of stakeholders

• For reduced budget, within time, monitoring and modeling demonstrated compliance to thresholds
Case Study – Schelphoek (NL)

• Sand nourishment while keeping ‘area alive’: pilot
• Intensive monitoring for pilot, and for compliance to strict execution triggers.
• AM used in preparation to get all stakeholders in line
• AM used in adjusting replenishment design following monitored effects
Other Case studies – London Gateway

• Dredging & reclamation with DO & TSS levels as safety net to sensitive receiver sites
• Monitoring showed impact of natural variability on threshold management, requiring modifications
• Baseline & thorough data analysis paramount
• Thresholds, with action plan, to avoid unnecessary control actions and to guarantee required environmental control
• Work approvals allowed for adaptive monitoring

Acknowledge: DEME / DP World London Gateway
Other Case studies – Stour/Orwell Estuary

• To offset anticipated effects of the deepening on estuary habitat, sediment recycling as mitigation: maintaining fine sediment budget, combining port development and support of local ecosystem.
• Following consent, concern about whether the recycling would be effective led to a Regulator decision to increase the recharge.
• Monitoring over the next few years showed muddy accretion in several areas, caused by recharging too much sediment in a less than ideal way.
• Further refinements of the mitigation have been effective and have not only mitigated for dredge but also greatly reduced background estuary erosion.
• Developer, harbour authority and regulator were able to agree on the principle of flexibility in the management approach.
• Process of mitigation and monitoring and learning and adaptation hard to pre-determine; if you pre-determine too much you end up being over cautious.

Acknowledge: HR Wallingford / HHA
Main Messages

• AM efficient and cost-effective management process when objectives clear, yet local environmental effects uncertain, and management actions implemented to address uncertainties as project progresses.

• AM to desired goals by addressing uncertainty, incorporating flexibility and robustness, with new information for decision-making as the project develops.

• AM “modern” approach, potential to become good practice; underlines commitment for process optimisation. Not likely AM to become good practice for all projects, but advantages mainly for larger and multi-year projects.
Working group AM 2013 - 2015

- Chris Adnitt  Royal HaskoningDHV  UK
- Marijn Huijsmans  Witteveen+Bos  Netherlands
- John Kirkpatrick  HR Wallingford  UK
- Ram Mohan  Anchor QEA, LLC  USA (corresponding)
- Marcel Van Parys  Jan De Nul  Belgium
- Gerard van Raalte  Boskalis / Hydronamic  Netherlands (Chair)
- Henrich Röper  Hamburg Port Authority  Germany
- Craig Vogt  Craig Vogt Inc  USA (corresponding)
Integrating Adaptive Environmental Management into Dredging Projects