



**Science Board of the Louisiana Coastal Area (LCA)  
Ecosystem Restoration Program  
CERM Building, University of New Orleans  
2000 Lakeshore Drive, New Orleans, LA 70148**

**Report from the Science Board Meeting  
December 13-14, 2006, New Orleans, Louisiana**  
Submitted to the Program Management Team, January 5, 2007

**Meeting Particulars:**

The third meeting of the Science Board for the Louisiana Coastal Area Ecosystem Restoration Program (LCA Program) was held at the Lindy Boggs Conference Center at the University of New Orleans on December 13 and 14, 2006. Nine of the eleven members of the Board (Appendix 1) were in attendance for all or part of the meeting.

The main objectives of the third meeting were to:

- discuss the preliminary draft of the State's Master Plan with representatives from the Governor's Office of Coastal Activities and Department of Natural Resources,
- review the activities of the LCA Program Science and Technology Program Office, and
- conduct a general round table discussion of the "leaky levee" concept included in the preliminary Louisiana Coastal Protection and Restoration Program (LaCPR) and State Master Plan.

The meeting agenda is provided as Appendix 2. In contrast to the first two meetings of the Board, the December meeting consisted principally of discussions among federal and state agency officers, Board members, and invited guests rather than presentations. This report summarizes the outcomes from the perspective of the Science Board. Key points are highlighted in boldface.

**State Master Plan:**

The Science Board members had been provided with a copy of the Preliminary Draft of the *Comprehensive Coastal Protection Master Plan for Louisiana* approximately two weeks prior to the meeting. This provided ample time to review the main body of the report, but members had not reviewed in any depth the voluminous appendices that are posted on the website [www.louisianacoastalplanning.org](http://www.louisianacoastalplanning.org).

Mr. Jon Porthouse, on assignment to the Louisiana Governor's Office of Coastal Activities, and Ms. Jean Cowan of the Louisiana Department of Natural Resources, both members of the Coastal Protection and Restoration Authority's (CPRA) Integrated Planning Team (IPT) that produced the report, participated in the discussion of the report. Mr. Porthouse stressed the preliminary nature of the report and that input and suggestions

from the Science Board were welcome. When asked how the Board could be of assistance, Ms. Cowan replied that they would appreciate input on sequencing and priorities. The IPT was in the midst of regional open houses and public meetings to receive comments on the report. In January 2007, the team will develop more specifics and cost estimates and prepare a draft plan for consideration by the CPRA in February. It is the understanding of the Science Board that the Final Draft Report will be delivered in April, 2007.

The region addressed in this planning process is very large and set within an area influenced by complex river and coastal process that are incompletely understood. The scientific components of the planning obviously have very real ramifications to the local communities, the local and national economy, and multiple interests. Despite the magnitude of this planning challenge and its implications to the people of Louisiana, the Science Board is very impressed by the progress that has been made since its September briefing and is appreciative of the openness of the IPT to its criticisms and suggestions. The following specific concerns of the Science Board are raised as result of its reading of the draft preliminary report and discussions during the meeting:

1. **The heavy emphasis on hurricane protection and cursory treatment of coastal restoration.** While it is understood that both legislative directive and citizen concerns require attention to hurricane protection early on, the scant attention to coastal restoration, including marsh creation and diversions, gives the impression that coastal restoration is seen as an overlay to hurricane protection strategies rather than an integral part of sustaining both the habitability and resource base of coastal Louisiana. It is important that coastal restoration rapidly catch up in the planning process and that the hurricane protection plans be rigorously evaluated with regard to their compatibility with a sustainable coastal landscape (see the discussion of “leaky levees” below).
2. **Reconciliation between the State Master Plan and the LaCPR plan being developed under the leadership of the Corps of Engineers.** Although there is obviously sharing of analyses and communication, the state and federal processes are moving at different paces and with somewhat different objectives and approaches. As the Science Board observed at its September, 2006, meeting, there does not seem to be a clear process through which the State and Corps will resolve differences or a mechanism for merging the planning efforts of the State and Corps of Engineers.
3. **Outreach to stakeholders not achieved by the regional open houses and meetings, including the regional scientific community, national environmental organizations, and maritime transportation interests.** While, interaction with the affected communities is essential, the Science Board points out that failure to connect with these other stakeholder groups could lead to show stoppers in terms of scientific credibility, the support needed to obtain federal investments, or legal challenges to strategies that are not defensible.
4. **More consideration of community adaptation as part of the Master Plan.** While the Board recognizes community recovery is being addressed by the Louisiana Recovery Authority and these considerations are to be folded into the

- Master Plan, there are a number of issues not considered in the preliminary draft that should be developed in the ultimate comprehensive plan, including so-called non-structural mitigation (zoning and other property development restrictions, new building requirements, flood-proofing, issues related to insurance, evacuation alternatives, etc.), out-migration and re-location, and cultural preservation.
5. **More explicit incorporation of climate change.** The Board cannot emphasize enough the skepticism on a national level about the success of hurricane protection and coastal restoration in the face of climate change. The comprehensive plan must make the case that potential increases in hurricane intensity are adequately considered and it must more explicitly incorporate the consensus forecasts of global sea-level rise into estimates of local, relative sea-level rise.
  6. **Sequencing and priorities.** The plan should include a rationale for project sequencing and prioritization in the face of limited resources. This need will become particularly apparent once cost estimates are included and the limitation of resources (not only money, but also sediments) is considered.
  7. **Threatened and endangered species.** Because of the legal preeminence of the Endangered Species Act it is not too early to bring in evaluation of risks and benefits to threatened and endangered species into the planning.

### **Responsibilities to the Corps of Engineers:**

A discussion was held among the members of the Science Board and representatives of the U.S. Army Corps of Engineers and U.S. Geological Survey concerning the role and responsibilities of the Board to the Corps. The Corps clarified its position that the LCA Program Science Board was not charged with formally reviewing the Louisiana Coastal Protection and Restoration (LaCPR) Plan as there was both internal, independent review as well as external review built into its planning process. Board members expressed their opinion that it was essential to their advisory role and consistent with previous discussions with Messrs. Dan Hitchings and Randy Hanchey that they offer comments and advice on the integration and compatibility of coastal restoration and flood protection. It was mutually agreed that this would continue in the form of regular advice rather than a formal review, especially with regard to the technical aspects of engineering design, which is outside the scope and expertise of the Science Board.

The Science Board appreciates the written feed-back it received from the Corps of Engineers on the report of its September 2006 meeting and encourages both the Corps and the State to respond on an ongoing basis and to charge it with specific advisory tasks where appropriate.

## Science and Technology Program:

Dr. Barbara Kleiss of the USACE Engineer Research and Development Center was introduced as the new Acting Director of the LCA Program Science and Technology Office, replacing Dr. Buddy Clairain, who is retiring. The Board thanked Buddy for his long service and cooperation and welcomed Barb. Dr. Kleiss reviewed the procedures for accessing the Science Board's website <http://el.erd.c.usacd.army.mil//cast/board.html>.

It was requested that the Science Board rank the 35 research thrust areas that had been compiled from canvassing agencies. Priorities are to be developed for presentation to the Program Management Team on January 24, 2007, after which detailed statements of need would be developed by February 1 and Requests for Proposals issues in the spring, depending on resolution of appropriations for FY 2007.

The Board felt it was more effective if it collectively deliberated on the research thrusts rather than have each member provide separate rankings. Furthermore, it found that numerical rankings were not appropriate given that some "thrusts" were core elements of the S&T Program that had to be maintained and others were very vaguely defined at this point. **Appendix 3 presents the Science Board's evaluations of the 35 research thrust areas in which they are grouped as ongoing essential ingredients, timely priorities, longer-term priorities, lesser priorities, trivial, and too vague to evaluate.**

## Leaky Levees

A lively, informative and thought-provoking discussion of multiple issues related to leaky levees was stimulated by perspectives provided by Professors Oliver Houck (Tulane University), John Day (LSU) and Denise Reed (University of New Orleans). Leaky levees are hurricane storm surge protection features designed to allow normal tidally and meteorologically driven flows through gates that can be closed to curtail storm surge. In other words, it is intended that functioning tidal wetlands will be maintained landward of the levee alignment. Leaky levees are a major feature of the Morganza-to-Gulf Hurricane Protection Project in the Terrebonne Basin that has long been in planning as well as many of the 1% level-of-protection levee alignments included in the State Master Plan as well under evaluation in LaCPR planning.

It is beyond the scope of this meeting report for the Board to summarize the discussion, particularly because it would involve interpreting what others said. Rather, the Board offers the following perspectives that should be taken into account as protection and restoration planning advances:

- 1. There are large uncertainties about the effects of leaky levees on enclosed tidal wetlands, including the degree of interference with water-level variations, vertical soil accretion and migration of fishery species; entrapment of saline waters if overtopped or breached and fresh waters from storm water runoff; and other water quality issues. Although they are designed to stabilize vertical fluctuations of water level, marsh management**

- schemes have often had deleterious effects on wetland sustainability, fishery habitat value, and entrapment of saline or fresh water.
2. Cases where a large portion of the estuarine basin is enclosed by a leaky levee (e.g. the Barataria Basin) are more problematic than where smaller areas of wetlands are so enclosed because of the technical and practical challenges of managing large volumes of water exchange.
  3. The compensation of diminution of sediments subsidies from the marine side by river diversions into the upper basins, as envisioned in the State Master Plan, is an intriguing but untested concept.
  4. Strong state laws and policies would be required to prevent development of low-lying areas protected by leaky levees. Otherwise, expanded development in subsiding polders would just bring more disasters.
  5. Despite the existence of leaky levees, for example along portions of the Morganza-to-Gulf alignment, surprisingly little scientific information is available on their effects on tidal exchange, sheet and subsurface flow, water-level fluctuation, wetland soil and plant dynamics, water quality, and ingress and egress by fishery species. Evaluation of these effects through field research, monitoring, and modeling should be a very high priority.
  6. In some regions the leaky levees have alignments that take into account physical processes and long-term evolution of the landscape. In others the alignments appear to be determined primarily for human infrastructure or political reasons. Where leaky levees are adopted, the alignments should be based on assessment of how the landscape will evolve around the new obstructions.
  7. The round-table forum was effective in exploring contrary, sometimes strongly held views in a way that illuminated misconceptions and allowed common concerns to emerge. The LCA Science and Technology Program Office should consider using such facilitated discussions to address other contentious issues in a direct and forthright way.

### **Science Board Position on Sediment Delivery**

As a follow up on discussions at its September meeting, the Science Board has developed a “position paper” on sediment delivery as a critical component of the LCA coastal ecosystem restoration program. The paper is included as Appendix 4. **The paper states the Board’s view that the only possibility for reaching a sustainable net “no wetland loss” objective is through conservation and effective utilization of the sediment load of the Mississippi River by creating major diversions of the Mississippi River sediment laden waters into shallow areas wherein the deposition can offset the relative sea level rise and other deleterious effects. It therefore proposes as a first-order metric of restoration success the volume of mineral sediment placed in shallow water. Further, the Board recommends convening a workshop in which the merits of various designs for large scale diversions are evaluated and undertaking a**

**demonstration project to evaluate the effectiveness of sediment delivery to shallow water.**

The Science Board is contemplating similar brief papers that it would prepare from time-to-time.

### **Next Meeting**

The best window for the next meeting of the Science Board is the **week of March 12**. Board members will be canvassed regarding their availability for a 2-day meeting during that period. **Issues timely for consideration at that time include: (1) comments on the Draft State Master Plan; (2) more in-depth consideration of the protection and restoration planning east of the Mississippi River, including the future fate of the Mississippi River Gulf Outlet, the Lake Borgne-Lake Pontchartrain barriers, and recovery response of the Caernarvon diversion area; and (3) outcome of LCA Science and Technology Program research prioritization.**

## Appendix 1

### LCA Program Science Board

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## **Appendix 2**

### **Agenda LCA Program Science Board Meeting University of New Orleans December 13-14, 2006**

#### **Meeting Location:**

Room 256, Lindy Boggs Conference Center, University of New Orleans, New Orleans, LA

#### **Meeting Purpose:**

The main objectives of this third meeting of the Science Board are to discuss the State's Master Plan with representatives from the State of Louisiana, to review the activities of the LCA S&T Program Office, and to have a general round table discussion of the "leaky levee" concept.

#### **Agenda:**

##### **Wednesday, December 13**

1:30 pm	State of Louisiana Master Plan	Jon Porthouse, LA DNR
3:30 pm	SB working session with the USACE	Buddy Clairain, Barbara Kleiss

##### **Thursday, December 14**

8:30 am	S&T Program Office Status &Activities	Buddy Clairain, Rick Raynie
10:00 am	"Leaky Levees" Round Table	Oliver Houck, John Day, Denise Reed
12:00 pm	Lunch Break	
1:00 pm	Science Board working time*	
2:30 pm	Adjourn	

\*This is an open meeting except for the slot listed as Science Board working time

### Appendix 3

## Comments by the LCA Program Science Board on FY 2007 LCA Program Science & Technology Program Thrust Areas

At the request of the Science and Technology Program Office, the Science Board collectively reviewed a listing of 35 proposed thrust areas during its December 13-14, 2006 meeting in New Orleans. While it was requested that Science Board members individually provide numerical rankings, the Board elected to discuss and evaluate the thrust areas collectively. It thus proved impractical to provide rankings 1 to 35; furthermore because of the incomparability of many of the thrust areas as well as their overlap such an approach made little sense. Rather, the following commentary is provided that summarizes the perspectives of the Board.

### Ongoing Essential Ingredients

Some of the thrust areas describe essential components of the S&T Program that have to be developed and maintained over the length of the program. Consequently, they really cannot be ranked in comparison with shorter-term tasks.

Thrust Area	Potential Projects	Comments
1	Continuation of adaptive management	Important to put in place, build on CWPPRA
2	Develop and maintain data management	Emphasize turning data into information into knowledge; consider new data management models
5	Summary reports that synthesize state of understanding	S&T Program Office should budget resources for this purpose on an ongoing basis

### Timely Priorities

Several thrust areas are highly relevant to integrated restoration-protection design and can be completed in the near term.

Thrust Area	Potential Projects	Comments
3	Relative sea level rise position paper	Important assessment from perspective of national credibility; should include projections based on new IPCC report
4	Develop information on vertical datum	Subsidence rates a key controversy that should be resolved; but isn't IPET doing this?
9	Evaluation of pass closure alternatives	Evaluation of large diversions and Birdsfoot abandonment should be advanced
11	Adding experimental features to CWPPRA projects	Seize good opportunities to extract information and adaptive learning
12	Wetland assimilation, alteration and function	Potentially valuable "meta-analysis" at this point
17	Influence of wetland on storm surge levels and wave patterns	This issue is critical to integration of restoration and hurricane protection and the 2005 hurricanes provide new insights and data that should be evaluated.
19	Source and characteristics of sediments in Regional Sediment Model	Important for optimizing conservation and utilization, esp. for diversions & barrier islands

### Longer-Term Priorities

These thrust areas seem relevant but require refinement, sorting out among them, or longer time frames for completion. Not all of them are of equal priority and most require more focus before committing to their execution.

Thrust Area	Potential Projects	Comments
6	Environmental benefits	These four thrust areas broadly overlap in objectives and purpose, but seem to take different approaches. More specific prioritization of physical-ecological-landscape responses analysis is required.
10	System-wide restoration priorities	
15	Continue refinement of desktop models	
16	High-fidelity landscape evolution and ecological model system	
20	Restoration project interactions with endangered species	Should address opportunities as well as conflicts
22	Role of wetland vegetation in erosion control	Important to integrate this with 17
26	Sediment trapping	It is unclear which project this refers to; nonetheless means to trap river sediment bed load should be evaluated
27	Pipeline conveyance	Seems like there is already much knowledge on this; should focus on practical application and be coordinated with 19
30	Geotechnical engineering of settlement rates	Could be very important the use of dredged sediment for restoration
31	Barrier island assessment	The description is extraordinarily sketchy, but improved design is undoubtedly required in barrier island restoration.

### Lower Priorities

While not unimportant, several thrust areas seem less critical to the success of the LCA Program.

Thrust Area	Potential Projects	Comments
21	Assessment of environmental impact of rock armoring deployment	In general, the Science Board favors rock armoring of marshes only in very limited circumstances.
23	Coastal forests	This could be more important if focused on establishing trees to protect levees in LaCPR
24	Assessment of effects of restoration projects on fisheries and shellfish	Seems like still wanting your cake and eating it too. Effective restoration will require substantial changes that might preclude the status quo.
28	Chenier restoration	Needs more justification in order to determine its relative importance and urgency
32	Verification of project performance with WVA predictions	WVA approaches are old way of thinking, need to design to optimize sustainability of landscape

### Trivial

One thrust area addresses what the Science Board considers a trivial concern.

Thrust Area	Potential Projects	Comments
29	Potential for introduction of invasive species using sediment from outside sources	This is unlikely to be significant

### Too Vague to Evaluate

Several thrust areas were unclearly defined or too all encompassing such that the Board is unable to evaluate their importance.

Thrust Area	Potential Projects	Comments
7	Risk assessment	Risks of what, for what?
8	Assessment of unique coastal Louisiana stressors	Too scattered an approach; requires focus on most critical stressors and most important unknowns
14	Enhance utilization of conceptual ecological models	No concepts.
18	Further fund monitoring workgroup	Monitoring is an essential ingredient, but the description seems all over the map and requires strategic focus
25	Further develop comprehensive approach for priority data analysis	Vague and unfocused
34	Marsh creation in areas with poor sediment	No description
35	Indirect benefits from barrier shoreline restoration	No description

## **Appendix 4**

### **LCA Science Board Position Paper on Sediment Delivery and Utilization**

#### **1.0 Introduction**

The rapid loss of wetlands in Southern Louisiana is a result of several causes, including extensive construction of river levees leading to sediment diversion off the shelf into deeper waters, canals which tear the wetland fabric and provide access for vessels that generate waves, and channels which allow penetration of salt water into formerly fresher water environments, among others. Additionally, significant wetland losses have occurred as a result of severe weather events, for example that due to hurricane Katrina being close to 220 sq. miles (vis-à-vis the total loss from 1932 to pre-Katrina 2005 of 1900 sq. miles). Similar to the diversity of causes of wetland losses, a range of remedial measures has been proposed, some of which have been implemented. Given the growing consensus that future hurricane damage reduction plans for the Louisiana coast must include sustenance or enhancement of wetland-dominated landscape, a rigorous evaluation of wetland reconstruction options is required. The purpose of this document is to present the position of the LCA Program Science Board (SB) on the issue of sediment delivery and utilization as a first step toward shaping meaningful approaches.

It is well known that the present wetland system is largely the product of channel switching processes that occurred on a timescale of approximately 1,000 years. Periodic abandonment of former long channels in favor of new shorter channels to the Gulf resulted in natural alteration of the sediment delivery system: new channels delivered the sediment load of the Mississippi River into shallower waters where they contributed to wetland construction, while the coarser sediments remained in more gulfward positions thereby nourishing the barrier island systems. Taking a cue from this natural process, it is our conclusion that the only possibility for reaching a sustainable net “no wetland loss” objective is through conservation and utilization of the sediment load of the Mississippi River by creating major diversions of the Mississippi River sediment laden waters into shallow areas wherein the deposition can offset the relative sea level rise and other deleterious effects. This same conclusion was reached in the NRC (2006) report and in the British Petroleum sponsored workshop of 36 scientists and engineers held in New Orleans in April, 2006 (Reed et al. 2006).

#### **2.0 A Recommended Metric of Project Effectiveness**

While realizing that the delivery of sediments must be accomplished with reasonable care, it is also noted that wetlands are opportunistic and will develop if given appropriate quantities of mineral sediments to form substrate on which vegetation can prosper. Placement must consider the existing salinity regime, nutrient (especially organic) loading and the best available assessment of the types and growth rates of landforms that these sediments will develop. It is useful to define a metric for quantifying success of projects intended for wetland generation. As a first order metric, which may be fine

tuned later, it is suggested that the metric be the volume of mineral sediment placed in shallow water.

### **3.0 Next Steps**

Effectiveness in countering the current wetland losses will require river diversion(s) at scales that have not been attempted. Any long term approach should use natural processes to the degree possible in order to be sustainable with increasing scarcity of hydrocarbon energy and other resources. Several designs of large scale diversions have been proposed at the conceptual and more detailed levels (e.g. [www.lacpr.usace.army.mil](http://www.lacpr.usace.army.mil)). Such large scale diversions may cause concern among various stakeholders, perhaps most notably the shipping industry which may be the stakeholder that would experience the greatest potential impact. A second concern may be the effectiveness of this approach in constructing wetlands and barrier islands. The SB supports the design of projects, initially at the demonstration level, to both establish the best designs for large scale diversions by natural forces and to demonstrate the effectiveness of the approach. Two such projects are described below.

#### **3.1 Screening of Existing and Possibly New Conceptual Designs**

The SB suggests convening a workshop at which the merits of various designs for large scale diversions would be evaluated and refined into one or more recommended designs. Selection criteria would include: (1) minimizing adverse impacts to stakeholders, (2) minimizing use of fossil fuels, (3) maximizing best estimates of wetland and barrier island development, (4) long term sustainability of the coastal ecosystem, and (5) minimize storm and flood damage to public and private infrastructure. This workshop would represent a logical step in the progression toward an optimal design.

Participants in the workshop would include potentially affected stakeholders, wetland scientists, and engineers and geologists capable of evaluating the feasibility of the designs.

#### **3.2 Demonstration Project to Evaluate Effectiveness of Sediment Delivery to Shallow Water**

This demonstration project would evaluate the effectiveness of sediment delivery to shallow water from natural processes in terms of their ability to construct wetlands and barrier islands. The project could entail the placement of one or more large dredges in the lower Mississippi River to deliver sediment laden water to the west of the present channel. Design variables would include the rates and locations of the placement and the mix of fine and coarse sediments. Although the sediment quantities are yet to be determined, they should be large, probably on the order of 10s of millions of cubic yards. Perhaps one dredge could pump primarily relatively coarse sediments from the channel bottom and the other concentrate on the finer fractions from the water column.

#### **4.0 References**

National Research Council. 2006. *Drawing Louisiana's New Map: Addressing Land Loss in Coastal Louisiana*. National Academies Press, Washington, DC

Reed, D.R. et al. 2006. *Envisioning the Future of the Gulf Coast*. Final Report and Findings from the Technical Group, New Orleans, LA.  
<http://www.futureofthegulfcoast.org/files/finalreport.pdf>