Sustainable Remediation Forum (SURF)
SURF 16: February 3 and 4, 2011
Tampa, Florida

SURF 16 was held in Tampa, Florida, on February 3 and 4, 2011, at the University of South Florida (USF). SURF members that participated in the 1½-day meeting are listed in Attachment 1 along with their contact information. The meeting marked the 16th time that various stakeholders in remediation—industry, government agencies, environmental groups, consultants, and academia—came together to develop the ability to use sustainability concepts in remedial decision-making. Previous meeting minutes are available to SURF members at www.sustainableremediation.org.

Meeting Opening

The meeting began with Mike Rominger (meeting facilitator) welcoming participants and thanking USF, in particular the Dr. Kiran C. Patel Center for Global Solutions, the School of Global Sustainability, and the College of Engineering, for hosting the meeting. Mike presented the mission statement of SURF and discussed meeting logistics and ground rules. He also explained evacuation procedures from the meeting areas to ensure a safe meeting experience for all. Mike stated that it was assumed that nothing discussed or presented contained confidential information. He explained that export control laws that pertain to the transfer of technology to non-U.S. citizens and their countries do not appear to apply, but advised participants to act appropriately for their organizations. Mike also mentioned antitrust issues.

Efforts to achieve "sustainable neutral environmental behavior" continued at this meeting. Name tags and tent cards were reused. Many participants brought their own coffee mugs and water bottles and used public transportation to travel to the meeting location. Some participants reduced the carbon footprint caused by their travel by purchasing carbon offsets. Efforts to achieve sustainable neutral behavior are ongoing and will continue at future meetings.

Mike thanked the Meeting Design Team for their work in planning the meeting agenda and the current SURF sponsors for supporting the organization. Members interested in sponsorship opportunities should contact Brandt Butler, SURF Treasurer (see Attachment 1 for contact information).

Welcoming Remarks

Dave Ellis (SURF President) welcomed participants and again thanked the hosts of the meeting and sponsors of SURF. Dave also thanked local Florida SURF members Ben Foster (ARCADIS) and Robert Armstead (WRScompass) for their efforts in helping to plan the meeting.

Thom Snelling (Chief Green Officer of the City of Tampa and Deputy Director for Growth Management and Development Services) welcomed participants to Tampa and commended SURF for its work. Thom told participants that, from his perspective, sustainability is about culture change—how to think differently and approach your life differently. He said that the City of Tampa continues its efforts through the U.S. Mayor's Climate Protection Agreement. His role is to coordinate programs that will help the City fulfill its commitment to the Agreement

and to advance the use of green building techniques and sustainable development practices. Thom said that Tampa received a gold-level Certified Green Local Government designation by the Florida Green Building Coalition. Thom explained the gold-level status and mentioned some local sustainable projects: a fire station with solar voltaic panels and solar-powered cable cars at the Lowry Park Zoo. He ended his remarks with a 1789 quote from Thomas Jefferson to James Madison, linking the quote to the current efforts of SURF: "Then I say, the earth belongs to each of these generations during its course, fully and in its own right. The second generation receives it clear of the debts and encumbrances [sic] of the first, the third of the second, and so on. For if the first could charge it with a debt, then the earth would belong to the dead and not to the living generation. Then, no generation can contract debts greater than may be paid during the course of its own existence."

Keynote Address

Kala Vairavamoorthy (Director of the School of Global Sustainability at USF presented the keynote address regarding how cities of the future will manage their water. He told participants that challenges such as climate change, urban population growth, and decaying underground structures are the external global change pressures facing cities today. Although these pressures create major change and uncertainty, Kala said that an imperative for change has not been created because systems within the cities continue to function. A research program, SWITCH, is designed to manage urban water in the future using a more coherent and integrated approach. SWITCH is co-funded by the European Union and a cross-disciplinary team of 32 partners from 15 countries around the world. The group shares and adopts more sustainable urban water solutions across different geographical, climatic, and socio-cultural settings through, among other efforts, demonstrations. Kala said that USF will be launching Latin America and Caribbean demonstration projects. The projects focus on creating a systems-based, flexible approach to managing the uncertainty of conditions and water scarcity in the future. Presentation slides are provided in Attachment 2.

Discussions focused on implementing the ideas presented in developing countries where the challenges revolve around poor sanitation and poor solid waste management. There, the challenges focus less on contamination and more on microbiology. Kala said that, in terms of the future, most large cities have followed a systemized approach to addressing these challenges. Small towns are used as locations to do things differently (e.g., use membrane technology to move water closer to communities). He stressed the importance of evaluating the feasibility of small footprint units that are affordable, energy sensitive, and highly functioning.

Presentations

Technical presentations at SURF 16 revolved around the meeting theme of improving water quality. The presentations and subsequent discussions are summarized in the paragraphs below. Attachments 3 through 11 contain the presentation slides.

Sustainable Remediation Research in Environmental Engineering at USF

Sarina Ergas and Maya Trotz, both professors in the Civil and Environmental Engineering Department at USF, presented their ongoing remediation research. Research topics discussed included (1) the attenuation of acid mine drainage by Fe(III) and sulfate-reducing bacteria, (2) perchlorate remediation using SUPeRB (sulfur utilizing perchlorate-reducing bacteria),

(3) vadose zone remediation using calcium polysulfate foam to sequester contaminants, (4) soil cleanup using REACH (remedial extraction and catalytic hydrodehalogenation), and (5) landfill leachate treatment using anaerobic membrane bioreactors. Sarina and Maya also presented an approach to implementing low-impact designs on a community level that emphasizes community awareness through research and education so that informed decisions can be made. Presentation slides are provided in Attachment 3.

Discussions focused on the sustainability efforts at USF. Maya said that grass-roots efforts began in 2005 and consisted of weekly meetings of a small group of people. An expo was held a couple of years later and interest increased. Now, USF has incorporated sustainability into all aspects of the university (e.g., sustainability course requirement). The remaining discussions focused on whether any efforts have been made to quantify the benefits of the sustainable efforts. Sarina said a new course, Green Engineering for Sustainability, is available and provides the foundation for green engineering design. Students work on an interdisciplinary project as part of the course.

Florida Department of Environmental Protection's Role in Phosphate Mining

Michelle Sims (Environmental Administrator, Bureau of Mining and Minerals Regulation, Florida Department of Environmental Protection) presented an overview of phosphate mining from the perspective of her Department. Michelle described the three eras of phosphate mining, ending with present-day regulations that both emphasize hydrology and wildlife corridors and include the more stringent requirement of stream reclamation. She presented some of the cumulative impact study findings of the Peace River in southwest Florida. Michelle presented the results of the internal wetland audit, which involved a wetland acreage comparison and a field wetland evaluation. She explained the Integrated Habitat Network (IHN) approach, which is a concept outlined in the "Regional Conceptual Reclamation Plan for the Southern Phosphate District of Florida" in 1992. The key elements of the IHN are that the Plan (1) benefits water quality and quantity for the basin by mitigating adverse impacts via a connected series of undisturbed natural communities and reclaimed habitats, (2) serves as a connection between rivers in the phosphate mining district and significant regional environmental features, and (3) improves wildlife habitat and connectivity by replacing and protecting habitat and dispersal corridors. Michelle ended her presentation with a photograph of successful reclamation at Hickey Branch, a tributary of Payne Creek that drains into the Peace River. Presentation slides are provided in Attachment 4.

Land Reclamation and Water Issues in the Phosphate Industry

Brian Birky (Research Director of Public and Environmental Health at the Florida Industrial and Phosphate Research Institute) presented the various land reclamation and water challenges facing the phosphate industry. He began with a brief background on the U.S. phosphate rock sources and showed a schematic of mining sites that are currently being used or are exhausted. Brian described the strip mining process, which is very water intensive; a typical mine site pumps out 1.5 billion gallons of water per year. Although water usage has declined, municipal water usage has increased. Brian told participants that the Institute has funded over 70 water-related studies covering a wide range of topics. The Institute's research has focused on reducing water use in mining and processing, improving the quality of discharged water, and reconstructing streams on reclaimed lands. Brian presented a water treatment and storage technique in which impounded

water is collected, biologically treated by natural means in a wetland, and filtered through a sand tailings area to remove particulates and bacteria. He also presented a few case studies involving stream restoration, uses for phosphatic clay settling areas, alternative cover systems, and hydrologic barriers to reduce water infiltration and improve runoff quality for phosphogypsum stacks. Presentation slides are provided in Attachment 5.

The Greening of a PRP-Led Site in Central Florida

Mark Fleri (WRScompass) presented a case study of a sustainability evaluation at a manufactured gas plant site in Florida. He gave a brief history of manufactured gas plants and said that over 3,000 of these sites exist in the U.S., including over 20 in Florida. Mark provided participants with a brief site description and history and detailed the scope of work, which involved stabilizing 90,000 cubic yards of material and removing 24,000 tons of contaminated soil. Efforts by the project team focused on the equipment, material, and fuel to achieve sustainability goals identified by the potentially responsible party (PRP). Mark detailed the results of the evaluation (e.g., 8,000 tons of carbon dioxide reduction), showing the input table used to calculate emissions and the details of the project-level carbon footprint calculation. He also reviewed the lessons learned by performing the sustainability evaluation, which include (1) using available data as a starting point but revising the numbers when better data are available or found; (2) tracking fuel, equipment, materials, and transportation at a minimum; (3) including multiple disciplines in the evaluation; (4) developing a library of emissions factors; (5) setting up databases with usage parameters that align with published emissions factors; and (6) evaluating the project as a whole to make the best decision for the environment and stakeholders. Mark also told participants not to underestimate the time required to perform the evaluation, not to expect others to be as enthusiastic about counting greenhouse gases, and not to get overwhelmed by the numbers. Presentation slides are provided in Attachment 6.

Discussions following the presentation focused on the details of the sustainability evaluation. When asked if his client specified specific sustainable remediation requirements, Mark said that his company pushed the idea of sustainability during the proposal phase and obtained acceptance of the program by the engineer. The real driver for the program, however, was the U.S. Environmental Protection Agency (USEPA) Region 4.

Panel Discussion: Deepwater Horizon Oil Spill

A panel discussion of the Deepwater Horizon Oil Spill included presenters from the U.S. Geological Survey (USGS), Florida Fish and Wildlife Conservation Commission, National Oceanic Atmospheric Administration (NOAA), Florida Institute of Oceanography, and SRI International. Each presentation is summarized briefly below.

- Jack Kindinger, Director of the St. Petersburg Coastal and Marine Science Center of the USGS, presented his organization's activities in response to the spill. Working with multiple stakeholders, the Center conducts comprehensive research to support management decisions. As part of this work, pre-spill sample data were collected and predictive modeling was performed. Armed with these baseline data, Center personnel were able to provide their scientific expertise and advice to the Department of Interior and Coast Guard. Pre-spill coastal photographs from the Center also proved useful for spill responders. The use of coastal protection berms to trap the oil

and prevent it from migrating to the marsh and inlets was researched, and the Center developed a report with recommendations and considerations for berm construction. Additional details are provided in the presentation slides provided in Attachment 7.

- Amber Whittle, Habitat Research Administrator of the Florida Fish and Wildlife Conservation Commission, summarized the role of her organization in the spill response. By statute, the Commission is required to respond to oil spills. Specifically, response activities included conducting initial ground and air reconnaissance movements associated with oil approach and landfall; implementing area contingency plans; serving as state scientific support coordinators; guiding key decisions on issues such as booming, shoreline protection, and cleanup; leading the sea turtle and manatee response; and developing response plans for oiled, injured, or dead wildlife. Amber presented statistics of wildlife species potentially impacted, a current status of marine fisheries, and ongoing and future efforts of the Commission to address the spill. Interestingly, she said that sea grasses have been affected most as a result of boom activities and an avoidance of booms by personal watercrafts rather than oil. More detailed information about these topics is provided in the presentation slides provided in Attachment 8.

- Captain Gary Patrae (retired), NOAA Scientific Support Coordinator of the Gulf Coast Incident Management Team, focused his presentation on the role of his organization in the spill, the challenges and public concerns emanating from the spill, the role of technology in spill response, and potential future concerns or issues. The primary objectives of the NOAA's involvement in the spill were to provide science support to decision makers, keep seafood safe, protect wildlife and habitats, assess natural resource damage, and restore the natural resources that were injured. Gary presented the subsurface and surface challenges, as well as the general public concerns about eating seafood, fishing, and swimming. Additional details are provided in the presentation slides provided in Attachment 9.

- Tim Short, Chemical Sensors Group manager of the Marine Technology Program within SRI International, presented how underwater membrane introduction mass spectrometry (MIMS) systems can be used to detect and quantify dissolved gases and volatile organic compounds (VOCs) such as those from the oil spill. Tim explained the importance of in-water chemical monitoring and mapping and gave examples of underwater mass spectrometry deployment methodologies. By using this technology for subsurface spills, dissolved gases, methane, and VOCs can be mapped in real time. Mapping results can be used to create adaptive sampling strategies and guide water sampling strategies. More detailed information about these topics is provided in the presentation slides provided in Attachment 10.

- William Hogarth, Acting Director of the Florida Institute of Oceanography and Dean of USF's College of Marine Science, described the response of the Oil Spill Academic Task Force. The Task Force consisted of 11 state and five private universities as well as two marine institutes. A web site was developed and served as a clearinghouse to share data and the latest information about the spill. As the Task Force attempted to answer key questions about the spill, academic researchers were seemingly at odds with the information provided in official government reports. The media picked up on the conflicting statements between the key organizations

involved. As the process continued, the key organizations worked together more synergistically and achieved the immediate project goals. Additional details are provided in the presentation slides provided in Attachment 11.

After all of these presentations, participants asked the panelists questions. One participant asked whether any of the material used in the response was reused after it was cleaned. Gary said that, in every case, response actions are designed to minimize waste. Regardless, opportunities to recycle materials are sought. He said that sorbent booms that can be cleaned sufficiently will be recycled into car bumpers. Another participant asked Tim if the technology he described could be used in cases where unintended consequences occur, such as when methane is released during sediment dredging projects. Tim responded that, although the technology is not currently used in this manner, the application seems to be a good fit. At the end of the discussion, one panelist noted the lack of templates for handling the oil spill. Despite the occurrence of previous oil spills in other locations, it seemed that spill responders were starting from scratch unable to leverage prior knowledge and lessons learned.

Board of Trustees Activity Update

The 2011 Board of Trustees election results were announced at the meeting (see table below). Board officers will serve a one-year term. At-large Board members will serve staggered terms of one and two years.

Name and Affiliation	Board of Trustees Position
Paul Favara, CH2MHILL	President
Dave Woodward, AECOM	Vice President
Maile Smith, Northgate Environmental Management	Secretary
Brandt Butler, URS Corporation	Treasurer
Stephanie Fiorenza, BP	Member At-Large
Karin Holland, Haley & Aldrich	Member At-Large
Steven Murawski, U.S. ELC	Member At-Large
Curt Stanley, Shell Global Solutions	Member At-Large
Dan Watts, New Jersey Institute of Technology	Member At-Large

The following additional reminders and updates were mentioned:

- Participants were reminded that it is time for SURF membership renewal. Renewing your membership is easy through the web site at http://www.sustainableremediation.org/membership/.
- Syracuse University has formed a student chapter. Participants welcomed Deepika Venkataramani, a student representative from the new chapter. Participants also welcomed the President of the Colorado State University student chapter of SURF, Kevin McCoy.
- The Programs and Meetings Committee is working on scheduling and organizing 2012 SURF meetings. Tentative plans are being made for a meeting in January or February 2012 in San Diego, California. SURF members willing to host a meeting should contact Mike Rominger (see Attachment 1).

As a reminder, detailed minutes from the Board of Trustees conference calls are available to members at the SURF web site in the members-only portion under "Member Resources," "Documents," "Administrative Documents."

SURF Activities Update

SURF members continue to work on initiatives that will further the mission of the organization. A portion of the SURF 16 meeting was devoted to updating members on the current status of these activities and obtaining member feedback on possible next steps. The presentations and subsequent discussions are summarized in the paragraphs below. Attachments 12 through 16 contain the presentation slides and other information generated during this portion of the meeting.

SURF Sustainable Remediation Site Database Initiative

Ray Lewis (SUNPRO) updated participants about the database initiative approved by the Board of Trustees. The initiative is being implemented in a phased approach by a committee of SURF members. Ray said that committee has developed a strategy for implementing the initiative and has obtained support commitment from the Illinois Institute of Technology (IIT). Specifically, the Chicago-Kent School of Law, Stuart School of Business, and Armour School of Engineering are involved. Ray explained the committee's plan of soliciting student interest in an independent study or research project as a means of obtaining and sorting data and helping to design the structure of the database. Ray told participants that Phase I of the initiative involves researching and designing the database prototype and is planned for May through August 2011. From August 2011 through January 2012, the committee will develop the database prototype (Phase II). In Phase III, the database will be expanded. Ray said that the scope of sites for the prototype focuses on sites within USEPA Region 5 and sites at other locations where accessible and high-quality data exist. Presentation slides are provided in Attachment 12.

Discussions focused on ways to organize the database information, select the appropriate data to include, and leverage existing efforts by other organizations. As a way to organize the database information, one participant suggested providing a brief overview of sustainability considerations throughout the project life cycle. Then, the information contained within the database provides users with examples. Another participant suggested developing data quality objectives for the database by determining the information that SURF wants to convey. Other participants suggested leveraging current efforts by the Department of Defense and the Brownfields program.

Several participants expressed concern regarding their personal experiences with database development overshooting allocated timeframes and resources. The participants explained that database development seems to have a nature of becoming encompassing and entangled with other interests.

Government Employees Outreach Initiative

Dave Woodward (AECOM) presented a brief overview of the background of the government outreach initiative, previous activities, and plans for 2011. Since 2010, SURF members working on this initiative have been reaching out to government employees to expand SURF's diversity of membership and increase interactions with regulators. Specific activities have been

highlighted in previous meeting notes and include development of an initiative mission statement, preparation of a standard letter to regulatory agencies, and creation of a standard presentation that SURF members can use when representing SURF in government settings. Dave said that, at the last meeting, initiative members identified the need to promote further education of sustainable remediation without advocating or lobbying for it and to present remediation case studies demonstrating the triple bottom line of sustainability to government employees. Dave highlighted the presentations made and planned by SURF members; presentations will continue in 2011. Additional plans for 2011 include developing a tracking system to document and communicate agency interactions and evaluating other options of and arenas for facilitating regulatory involvement and membership in SURF. Presentation slides are provided in Attachment 13.

Discussions focused on some of the barriers that regulatory personnel face in attending SURF meetings and suggested solutions to increase participation by these individuals. One participant said that the regulators with whom he spoke find it difficult to join SURF or attend meetings because of funding constraints. Solutions to this challenge were discussed and include inviting agency personnel to participate in a panel discussion at a meeting, providing the agenda well in advance of the meeting so that travel arrangements can be made and approved, and using tools such as a webinar to make remote participation in meetings more meaningful. Another participant encouraged initiative members to strengthen SURF's existing relationships with other government employees such as the U.S. Navy and Air Force.

Technical Initiatives

Paul Favara (CH2MHILL) reviewed the accomplishments of the Technical Initiatives Committee to date and congratulated authors on completion of the following three articles that will appear in the summer issue of *Remediation*:

- *Framework for Integrating Sustainability into Remediation Projects* by SURF members Karin Holland (Haley & Aldrich), Ray Lewis (SUNPRO), Karina Tipton (Brown and Caldwell), Stella Karnis (Canadian National Railway), Carol Dona (U.S. Army Corps of Engineers), Erik Petrovskis (Geosyntec Consultants), Louis Bull (Waste Management), Deborah Taege (The Boeing Company), and Christopher Hook (Tetra Tech)
- *Guidance for Performing Footprint Analyses and Life-Cycle Assessments for the Remediation Industry* by Paul Favara (CH2MHILL), Todd Krieger (DuPont), Bob Boughton (California EPA), Angela Fisher (GE), and Mohit Bhargava (Battelle Memorial Institute)
- *Metrics for Integrating Sustainability Evaluations into Remediation Projects* by SURF members Brandt Butler (URS Corporation), Lorraine Larsen-Hallock (Tetra Tech), Ray Lewis (SUNPRO), Christopher Glenn (Treadwell & Rollo), and Robert Armstead (WRScompass).

With the above efforts nearly completed, Paul facilitated a brainstorming session to generate ideas for technical initiatives to be initiated in 2011. Presentation slides are provided in Attachment 14. After the brainstorming session, ideas were grouped into focus areas. Participants volunteered to screen the ideas and identify the best opportunities in which to invest time and effort. Using a screening process, the best ideas will be further developed into brief,

one- to two-page proposals for Board of Trustees review. Attachment 15 contains the list of ideas generated as well as the categories and volunteers leading the effort.

Academic Outreach Initiative

Mike Rominger (MCR Facilitation Services) facilitated a brainstorming session to gather academic research ideas to further SURF's mission. Specifically, Mike gave participants the following four questions to answer (see Attachment 16 for presentation slides):

1. What don't we know that we should know about sustainable remediation?
2. Which technologies are crying out for improvement?
3. What research are you seeing out there?
4. Who or what comes to mind as someone or something that might offer some valuable research opportunities?

Participants were given three minutes to write their responses to each question and were encouraged to list as many ideas for each question as possible. The group discussed a few responses briefly after each question. Responses were collected and compiled and are being processed by Academic Outreach Initiative members.

Lecture, Poster Session, and Reception

After lunch on the second day of the meeting, many SURF members attended a lecture by Dave Dzombak of Carnegie Mellon University. Dave spoke to SURF members at the last meeting in Pittsburgh, Pennsylvania and was speaking at USF as part of the USF College of Engineering 2011 Eminent Scholars Lecture Series. Dave spoke to students and SURF members about the need and challenge of alternative sources of water for use in electric power production. Immediately following the lecture, professors and masters students from USF, University of Florida, and University of Central Florida held a poster session. SURF sponsored the reception during the poster session as members and students networked.

Action Items

The following action items were identified during the meeting:

1. Upcoming meetings are scheduled as noted below. Please note that these dates can change; the most up-to-date information is posted on the web site. If you are a SURF member and would like to help plan or host an upcoming meeting, contact Mike Rominger (meeting facilitator) (see Attachment 1 for contact information).
    - SURF 17: May 19th and 20th – USEPA Region 5 (Chicago, Illinois)
    - SURF 18: September 21st and 22nd – Boeing Corporation and AECOM (Seattle, Washington)
2. The work of the committees and initiatives will continue. Action items for specific committee and initiative members are detailed throughout these notes. All scheduled conference calls for the various committees and initiatives are shown on a calendar on the web site. The calendar is located on the members-only portion of the SURF web site under "Member Resources, Committee Calendar." SURF members interested in joining a particular effort should contact the co-chairperson directly.

ATTACHMENTS

Attachment 1
SURF 16 Participant Contact Information

SURF 16 Participant Contact Information

Participant	Affiliation
Adams, Kathy	Writing Unlimited
Armstead, Robert	WRScompass
Birky, Brian	Florida Industrial and Phosphate Research Institute
Buckingham, James	University of South Florida
Denson, Scott	SUNPRO
Dugan, Pamela	Carus Corporation
Ellis, Dave	DuPont
Ergas, Sarina	University of South Florida
Favara, Paul	CH2MHILL
Fiorenza, Stephanie	BP
Fleri, Mark	WRScompass
Foster, Ben	ARCADIS
Garson, Nick	The Boeing Company
Ginn, Jamie	DuPont
Hadley, Paul	California Department of Toxic Substances Control
Hogarth, William	Florida Institute of Oceanography
Holland, Karin	Haley & Aldrich
Karnis, Stella	CN
Kindinger, Jack	U.S. Geological Survey
Kluger, Mark	Dajak, LLC
Lewis, Ray	SUNPRO
Marotte, Rick	MACTEC Engineering and Consulting
Mazgaj, Jan	HDR Engineering
McCoy, Kevin	Colorado State University Student Chapter
McRae, Gil	Florida Fish and Wildlife Conservation Commission
McMaster, Michaye	Geosyntec Consultants
Mesa, David	University of South Florida
Mogge, John	CH2MHILL
Moxley, Katie	The Boeing Company
Petrae, Gary	National Oceanic Atmospheric Administration
Pittenger, Scott	AECOM
Raymond, Dick	Terra Systems
Rees, Todd	Golder Associates
Rominger, Mike	MCR Facilitation Services
Ryan, John	AECOM
Short, Tim	SRI International
Simon, John	WSP Environment & Energy
Sims, Michelle	Florida Department of Environmental Protection
Smith, Maile	Northgate Environmental Management
Snelling, Thom	City of Tampa
Stanley, Curt	Shell Global Solutions
Stimus, John	EN Rx, Inc.
Torrens, Jake	AMEC Geomatrix
Trotz, Maya	University of South Florida

SURF 16 Participant Contact Information

Participant	Affiliation
Vairavamoorthy, Kala	University of South Florida
Venkataramani, Deepika	Syracuse University
Watts, Dan	New Jersey Institute of Technology
Wice, Rick	Shaw Environmental & Infrastructure Group
Woodward, Dave	AECOM
Remote Attendees	
Beil, Kurt	ARCADIS
Claypool, John	AECOM
Butler, Brandt	URS Corporation
Fisher, Angela	GE Global Research
Murawski, Steven	Baker & McKenzie
Pearson, Erik	ENVIRON International Corporation
Tipton, Karina	Brown and Caldwell

Attachment 2
Keynote Address

Cities of the Future

Kala Vairavamoorthy

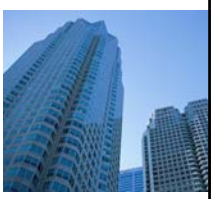
Sustainable Urban Remediation Forum (SURF)

3rd Feb 2011 – USF, Tampa, Florida

Hazards - New challenges

- **Entire earth system is changing!**



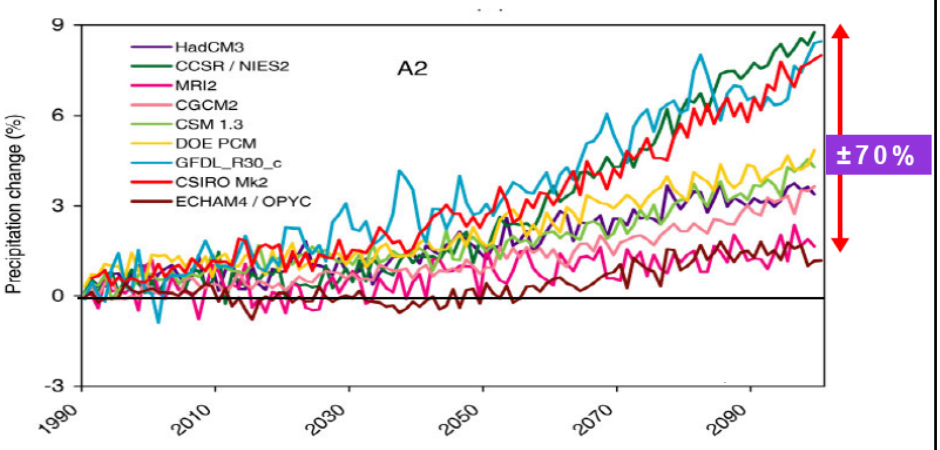




Resilient Tampa Bay Conference

February 21st - 23rd 2011

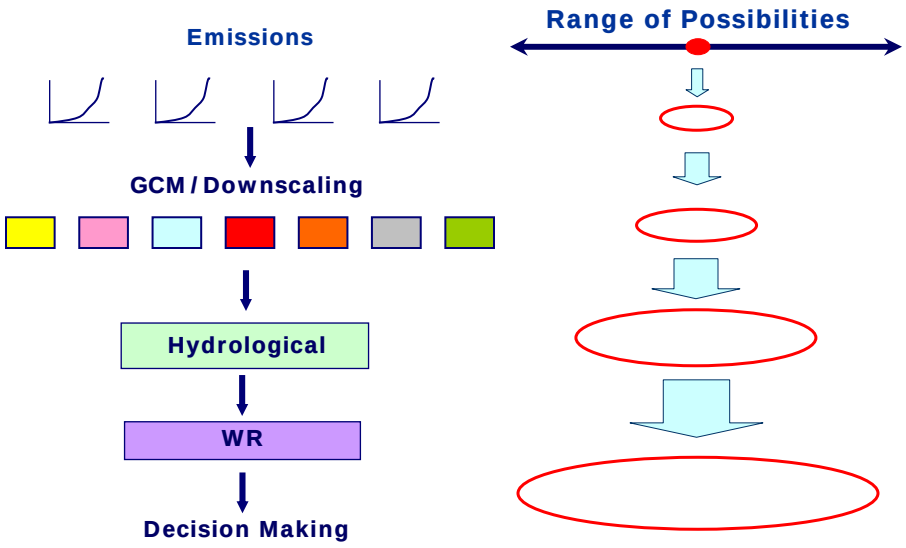
Patel Training Toolkit for Resilient Coastal Cities

Changes - Uncertainties

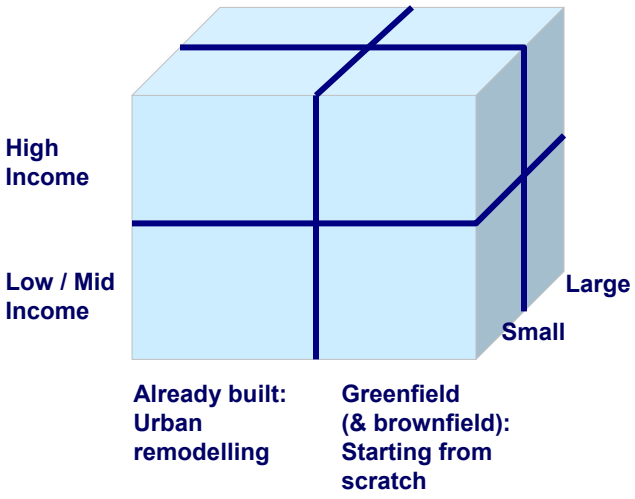


Source: Hadley Centre

Uncertainties in predictions



The Application Space



Let's Tally Up

Population Growth + Urbanization
+ Rising Standards (Health, Environ)
+ Climate Change

= **Major Change and Uncertainty**

Imperative for Change ?

"One of the main barriers to turning knowledge into action is the tendency to treat *talking* about something as equivalent to actually *doing* something about it."....

Knowing-doing gap (Pfeffer and Sutton)

Way Forward

SWITCH

Managing Urban Water for the Future

32 partners from 15 countires

Netherlands, UK, Germany, Israel, Brazil, Colombia, Peru, Spain, China, Ghana, Greece, Palestine, Egypt, Poland, Switzerland

40 PhD's

12 global cities

USF UNIVERSITY OF SOUTH FLORIDA | Global Sustainability | Global Solutions

UNESCO-IHE Institute for Water Education

SWITCH

Latin America & Caribbean

SWITCH-LAC

Proposed demos include:

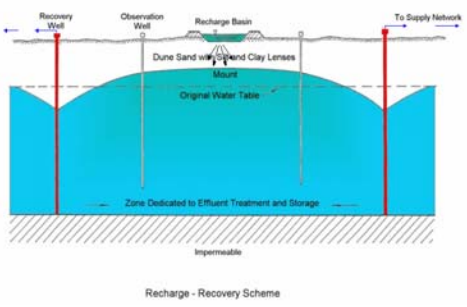
- Belo Horizonte
- Bogotá
- Cali
- Lima
- Mendoza
- Rio de Janeiro / Niteroi
- Tampa
- Tegucigalpa

Way Forward

- **Learning Alliances**
- **Greater Integration**
- **Adaptive / Flexible Approaches**

Game Changers

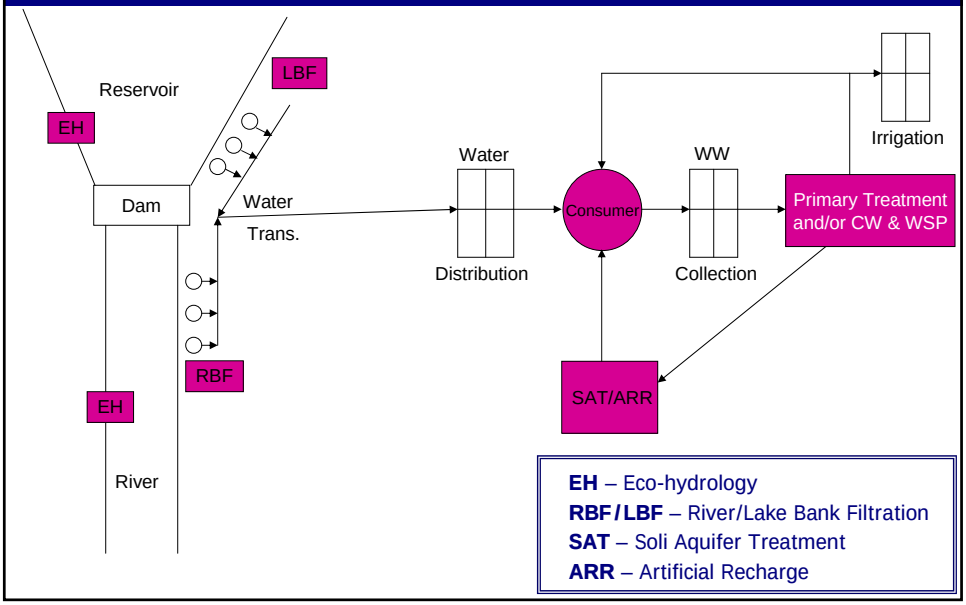
Natural Treatment Systems



Recharge - Recovery Scheme

Membranes

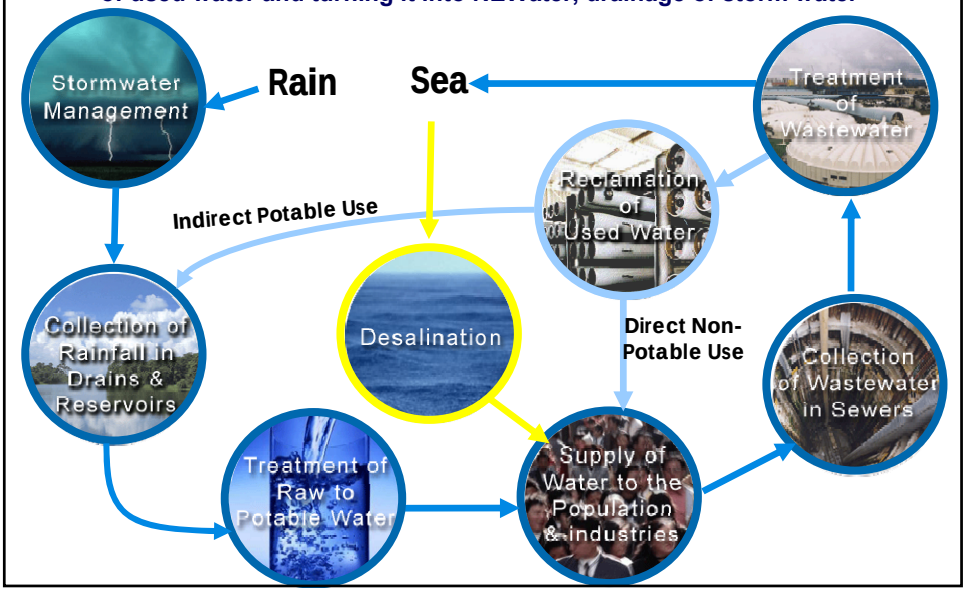
More is needed than simply improving component parts



Integrating the Water Loop : Water for All

PUB manages the complete water cycle

From sourcing, collection, purification and supply of drinking water, to treatment of used water and turning it into NEWater, drainage of storm water



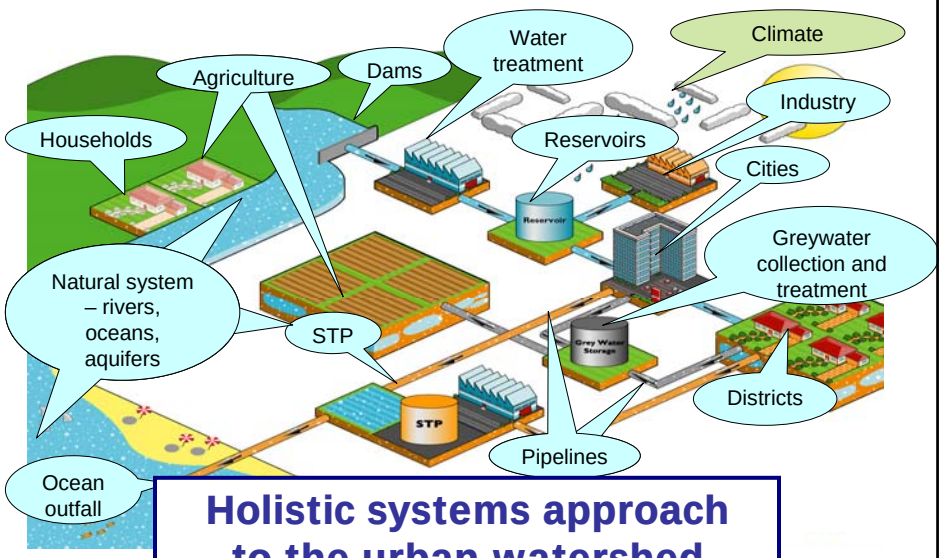
Way Forward

- **Component & System Change**
- **Greater Integration**
- **Adaptive / Flexible Approaches**

Way Forward

- Learning Alliances
- **Greater Integration**
- Adaptive/Flexible Approaches
- Security Through Diversity

City of the Future - Integration



Holistic systems approach to the urban watershed

SWITCH City Water

SWITCH

CITY WATER

A knowledge and information sharing platform to support global and integrated urban water planning

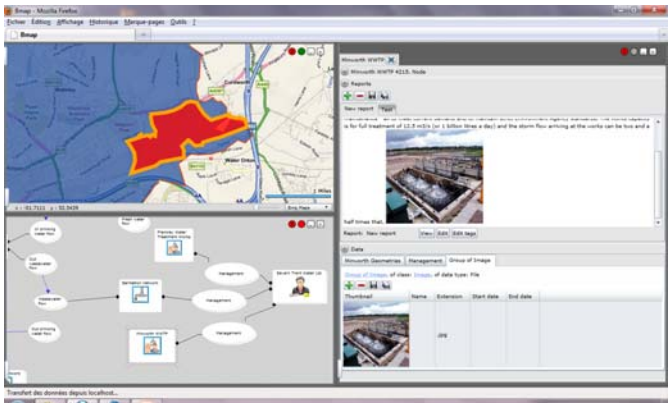
offering

A Combined Information System,

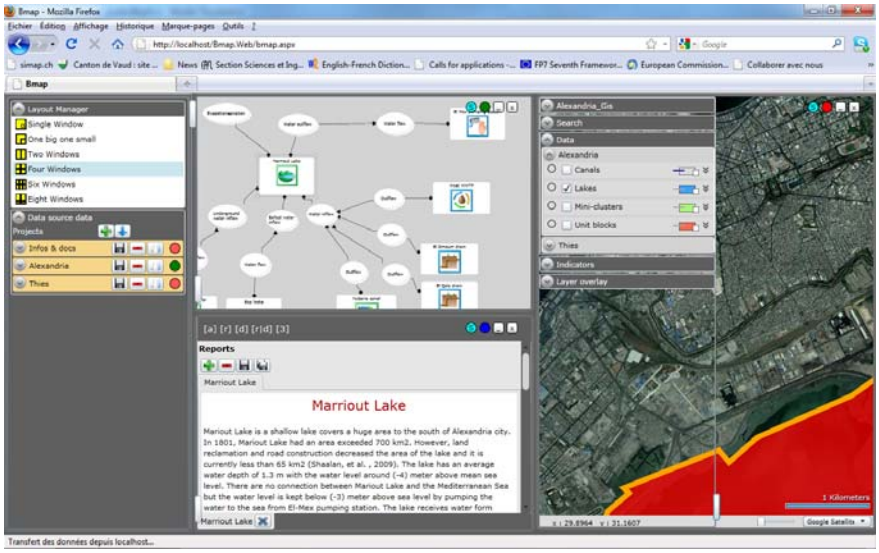
- Generic Database
- Geographic Viewer
- Reporting tool
- Systemic Viewer
- And more…

Linked to a Set of Screening Models

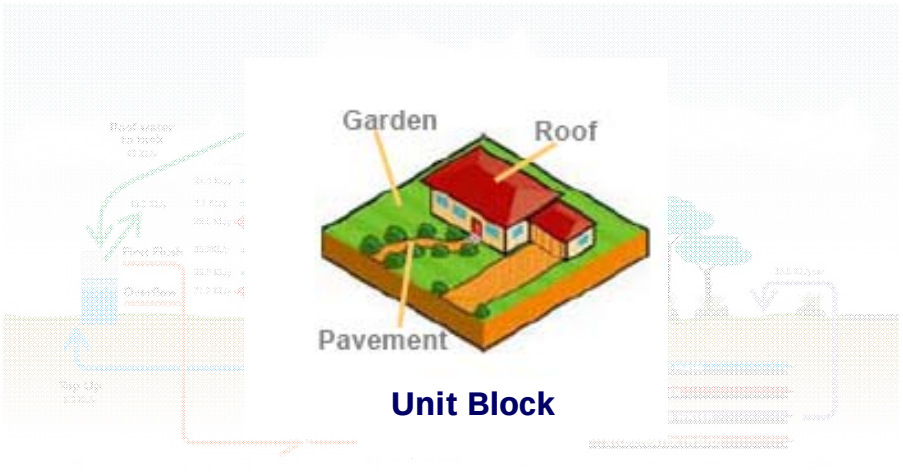
- City Water Balance
- City Water Economics
- City Water Drain
- And more…



SWITCH City Water



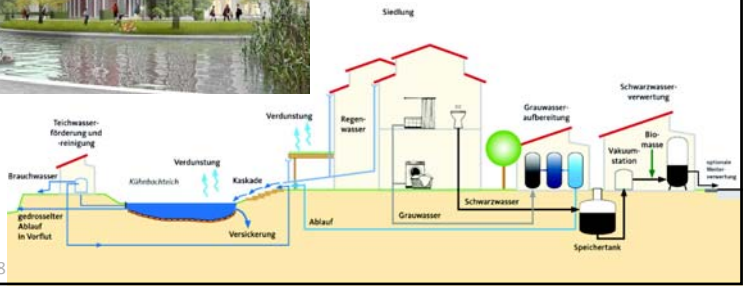
Interventions over urban water cycle



Unit Block

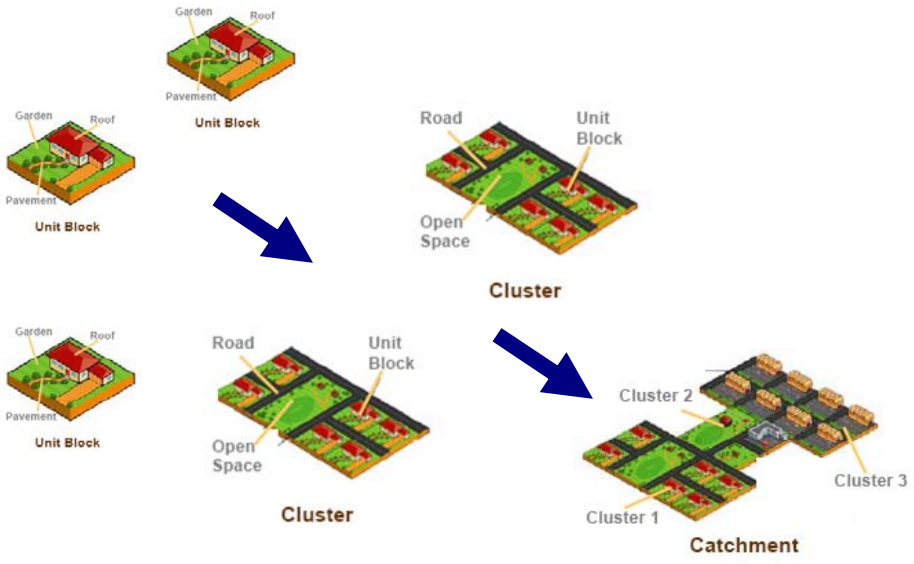
Cascading Uses of Water- Hamburg

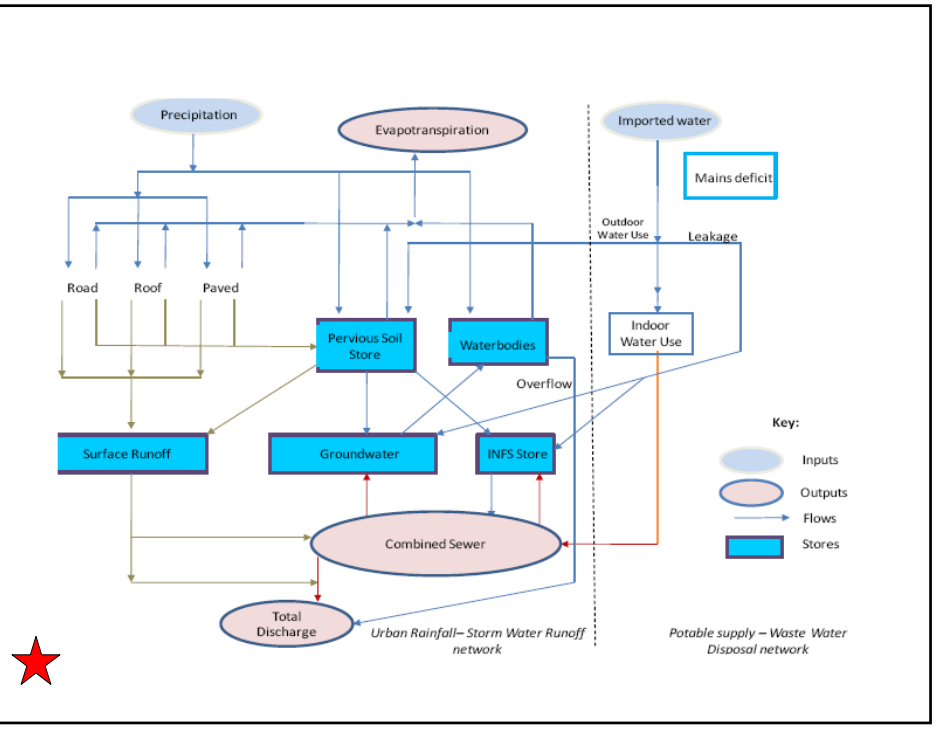
Hamburg Water Cycle - Demonstration Project Jenfeld



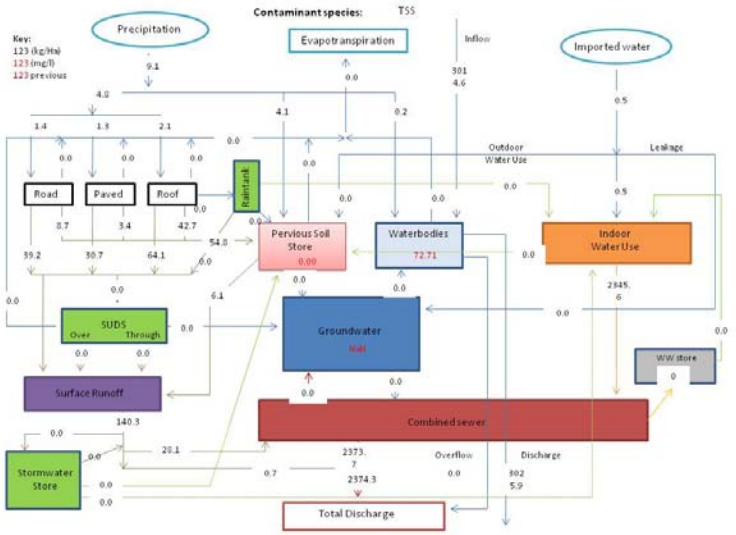
Augustin Schonlau 2008

Interventions over urban water cycle





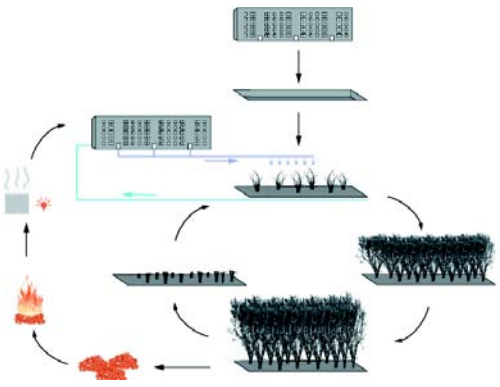
CWB Output – Flows



Mackay 2010

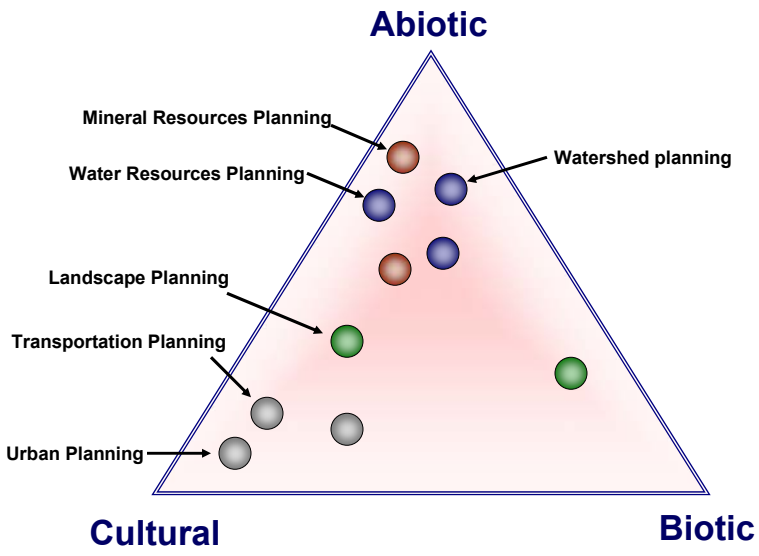
Reuse of Resources - Rostock

Case Study Mueßer Holz - Infrustructural landscape approach within shrinking cities



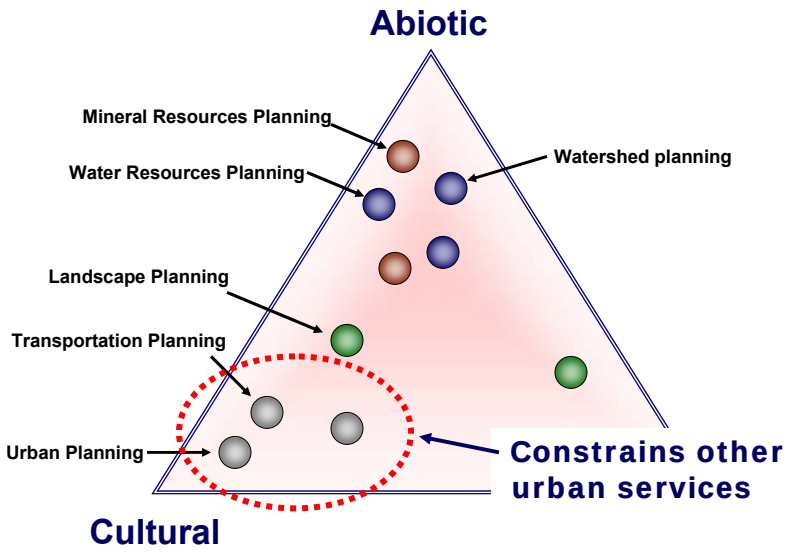
Stokman 2008

Greater Integration



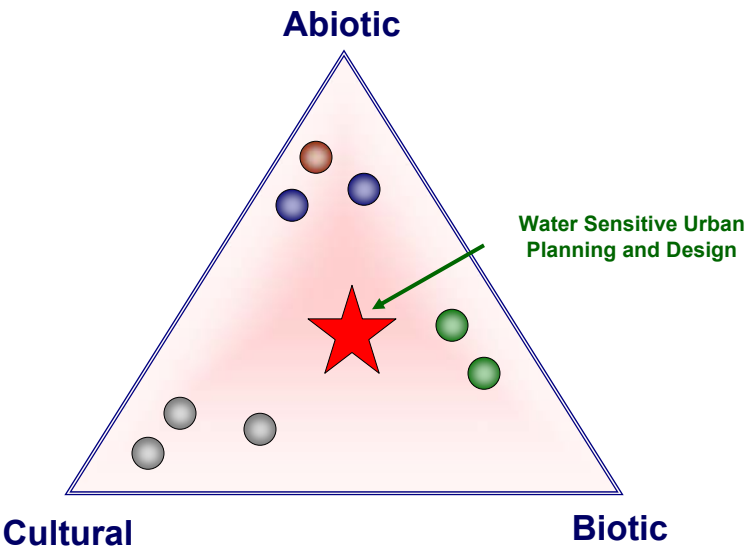
Ahern, 1995

Planning - Lack Integration



Ahern, 1995

Greater Integration

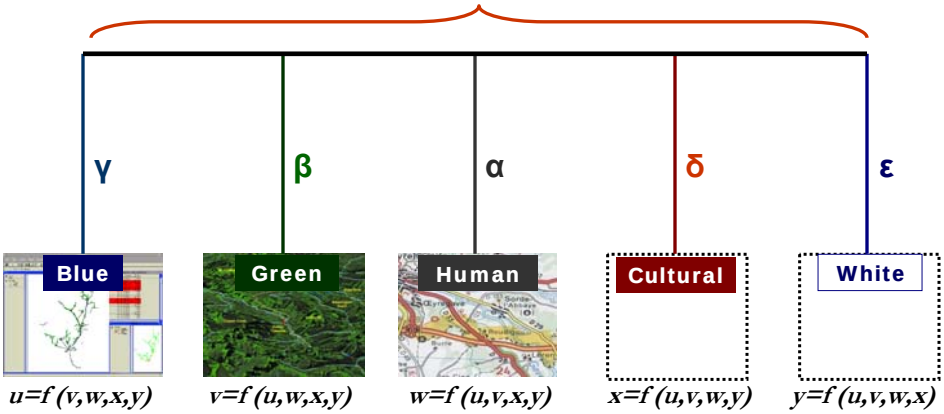


Ahern, 1995

New challenges – New Thinking

- **Multi-objective urban planning (what should drive the urban plan?)**

$$Z = (\gamma.u + \beta.v + \alpha.w + \delta.x + \varepsilon.y)$$




0.3 m³/m²


0.3 m³/m²


0.3 m³/m²


0.3 m³/m²

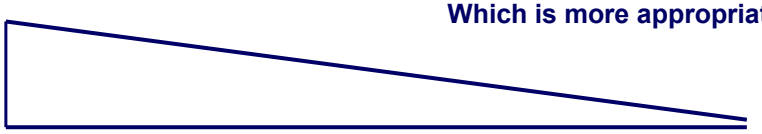
Greater Integration

Allows optimizing within a continuum of options

Which is more efficient?

Which is more sustainable?

Which is more appropriate?



Large Scale — Nodal — Cluster — In Situ

Need for Interfaith Dialog !

Highly Centralized — Highly Decentralized

The water sector can't do it alone

Need to create Utilities of the Future that lead innovation

- **Direct utility investments towards integration**
- **Advocate for funding, regulations and incentives**

Land planners
Architects
Developers

Gov't officials
Financiers
Energy experts

Way Forward

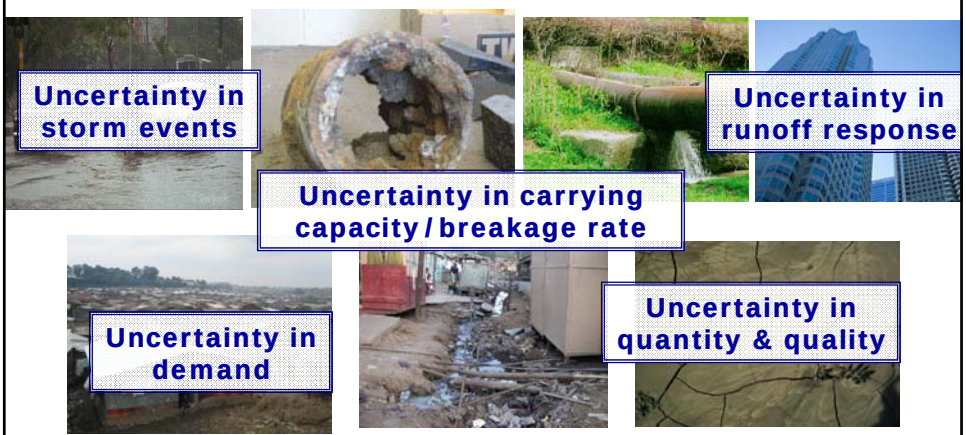
- Learning Alliances
- Greater Integration
- Adaptive/Flexible Approaches

Way Forward

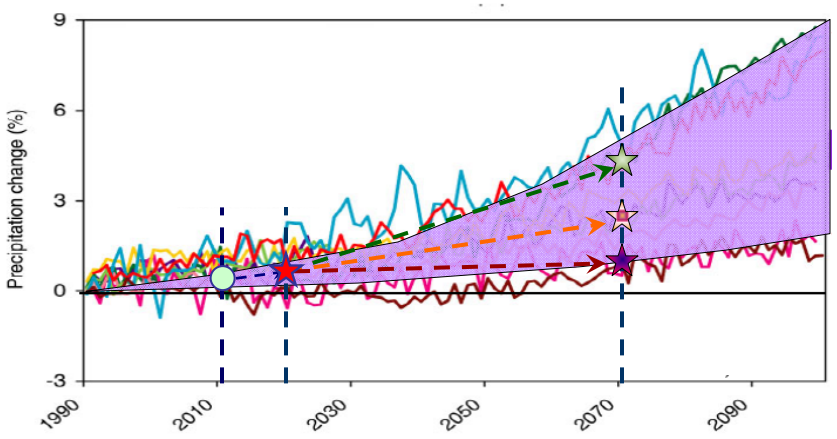
- Learning Alliances
- Greater Integration
- Adaptive/Flexible Approaches
- Security Through Diversity

New challenges – New Thinking

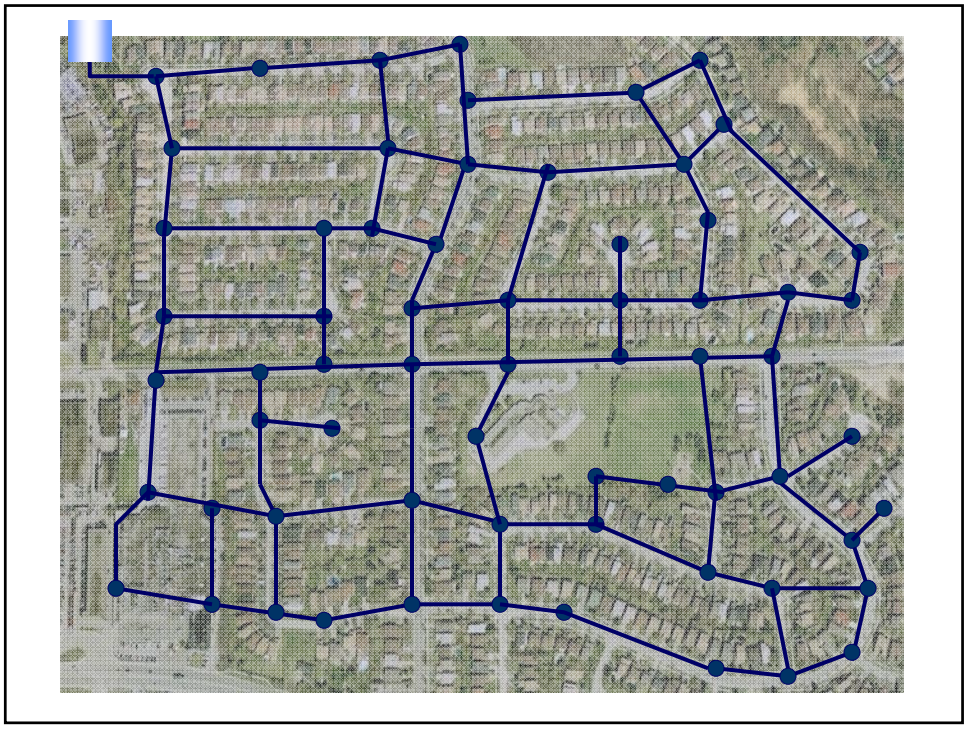
- **Entire earth system is changing!**

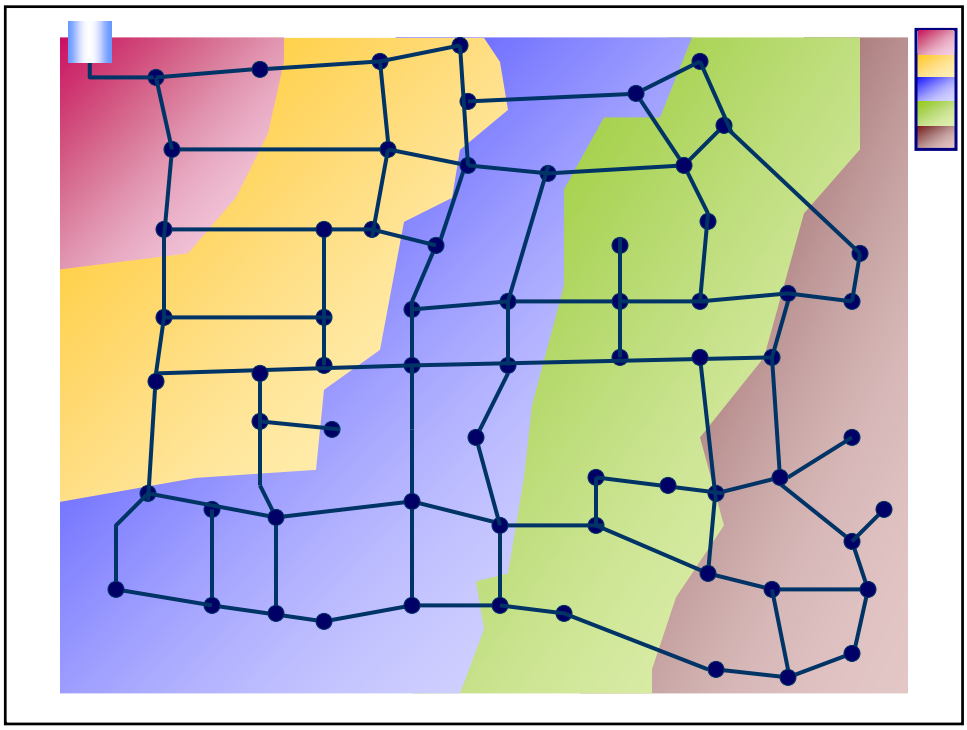


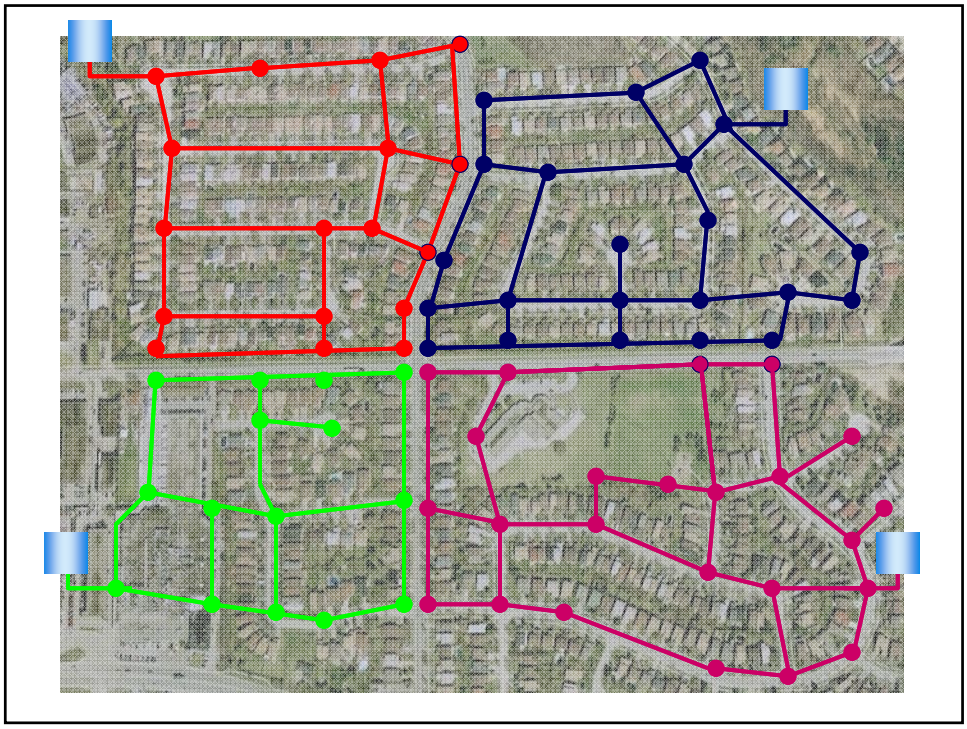
Decision Making in Uncertain World

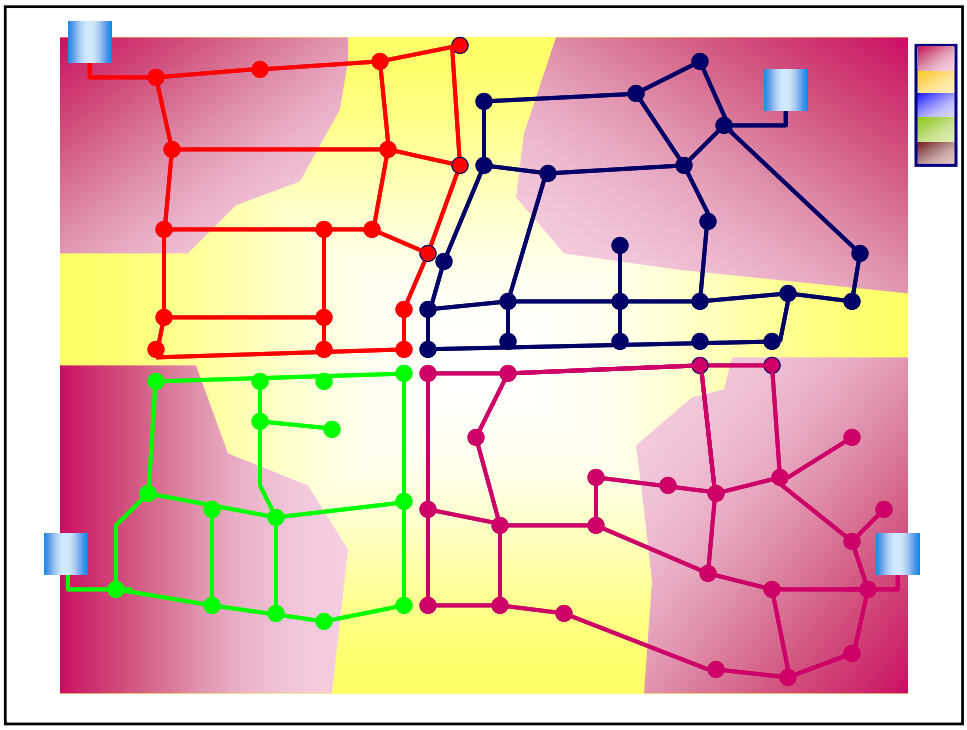


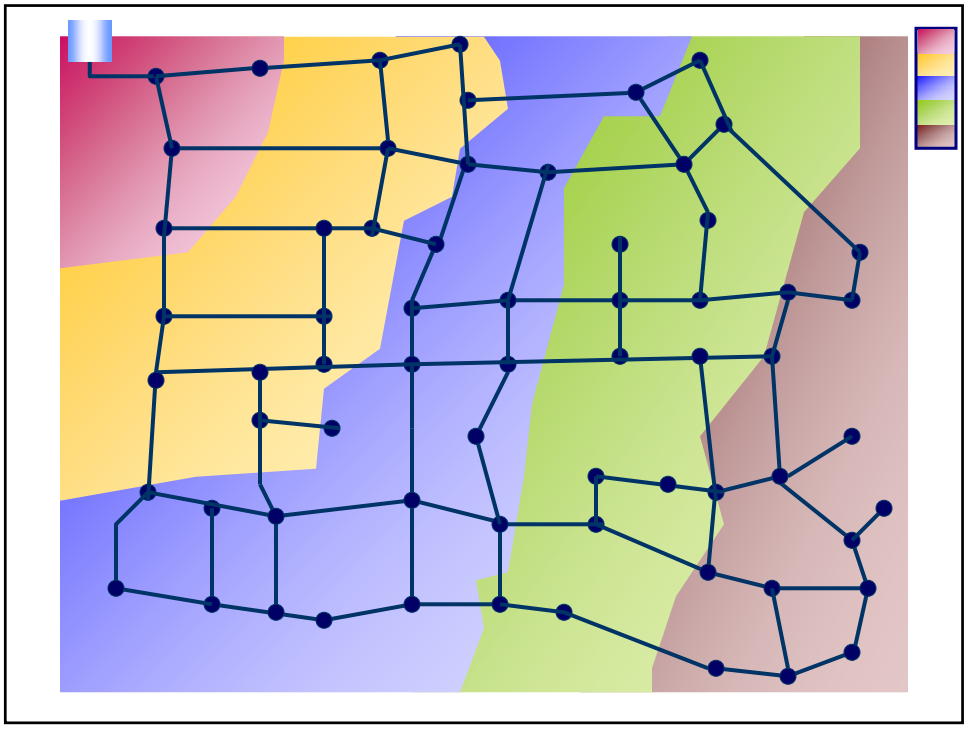
Source: Hadley Centre

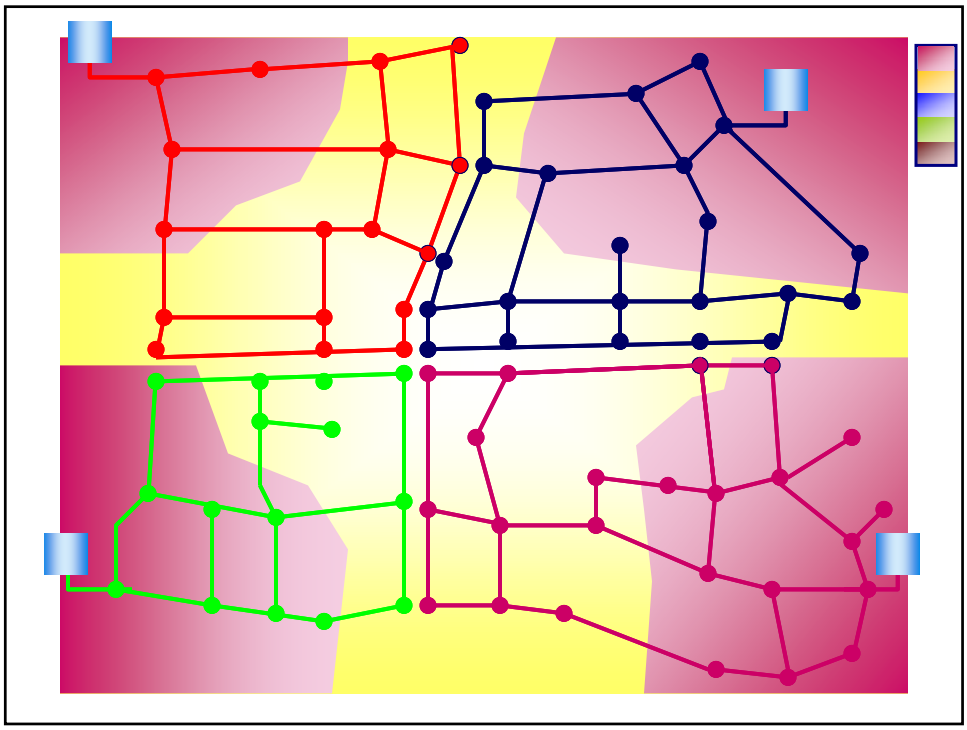


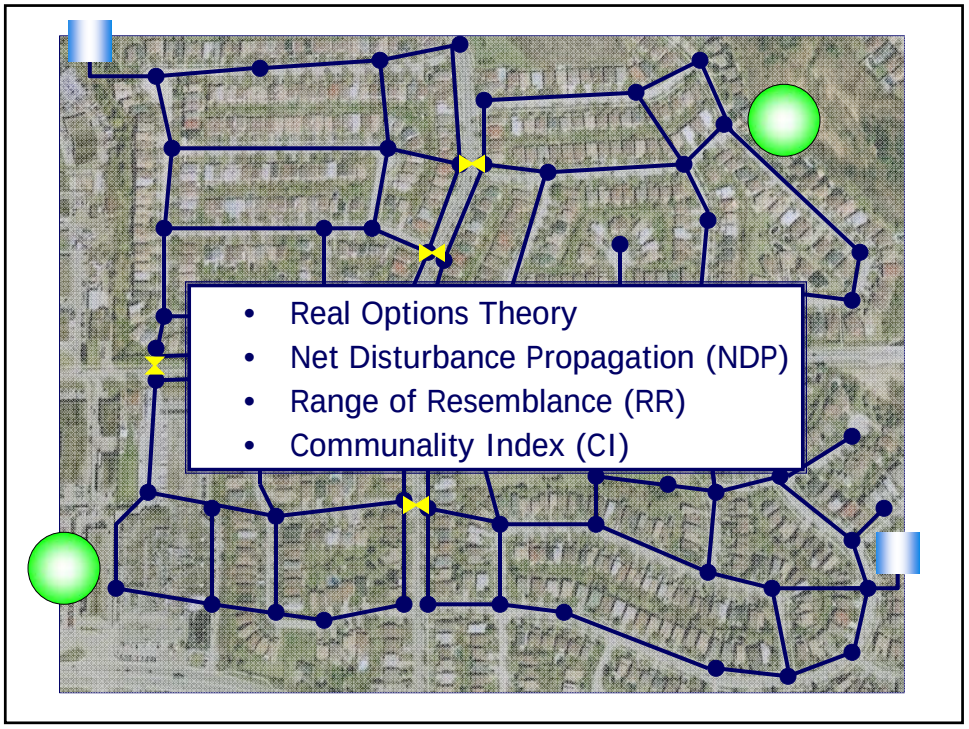




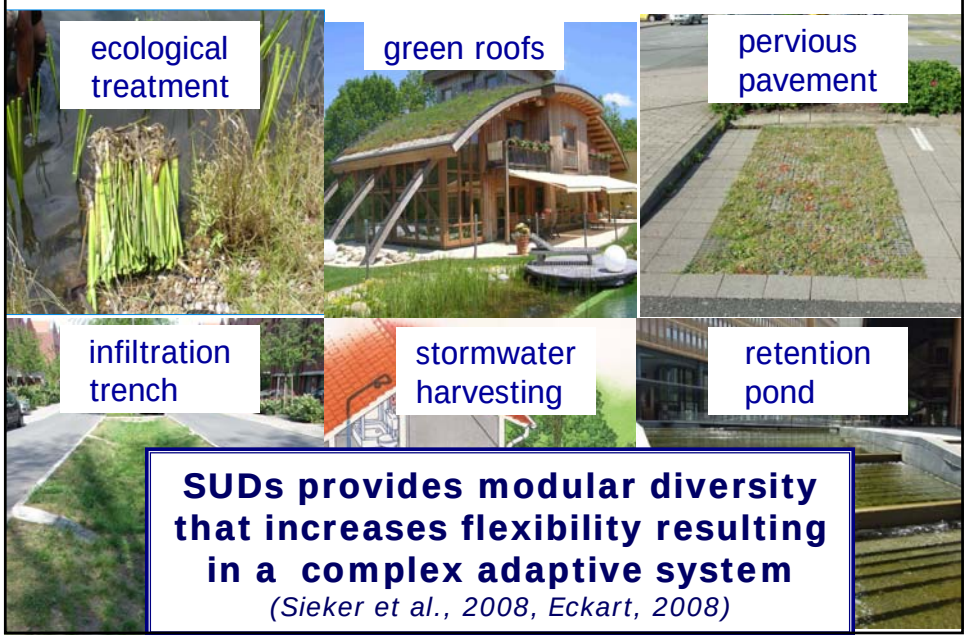








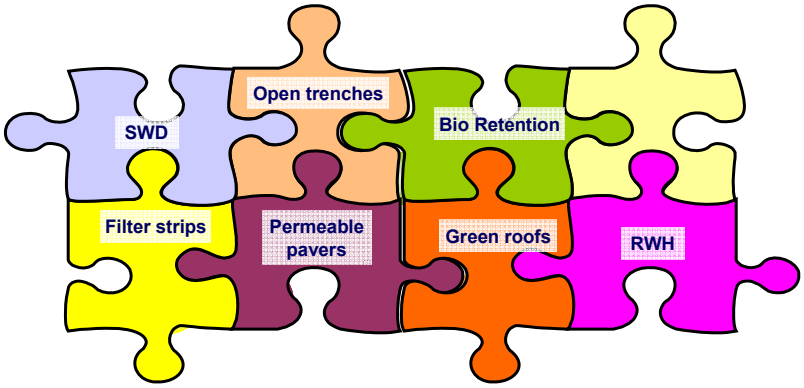
Sustainable Urban Drainage

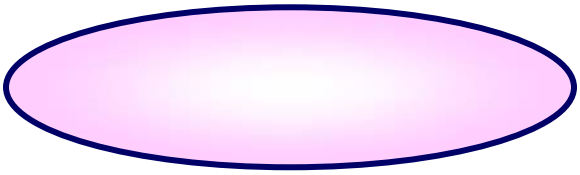


SUDs provides modular diversity that increases flexibility resulting in a complex adaptive system

(Sieker et al., 2008, Eckart, 2008)

Examples of activities

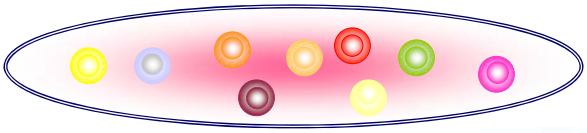


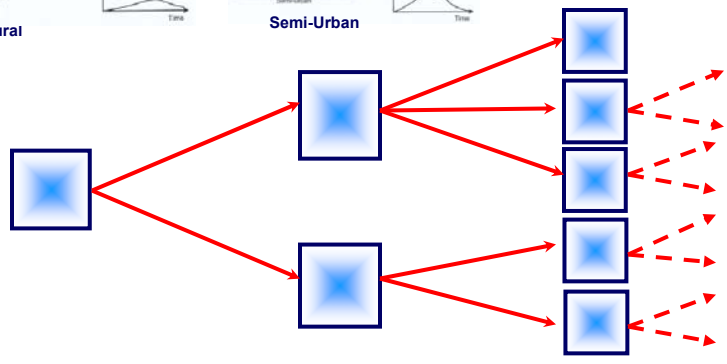


Suite of Options

8

Urban Drainage Modular System

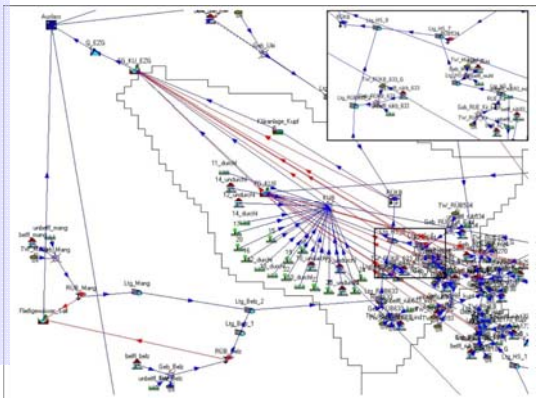




Time

Measurement of Flexibility - Case Study Kupferzell

- Stormwater master plan for Kupferzell, a small City in southern Germany
- 4 futures scenarios have been developed
- 4 different alternative solutions have been designed

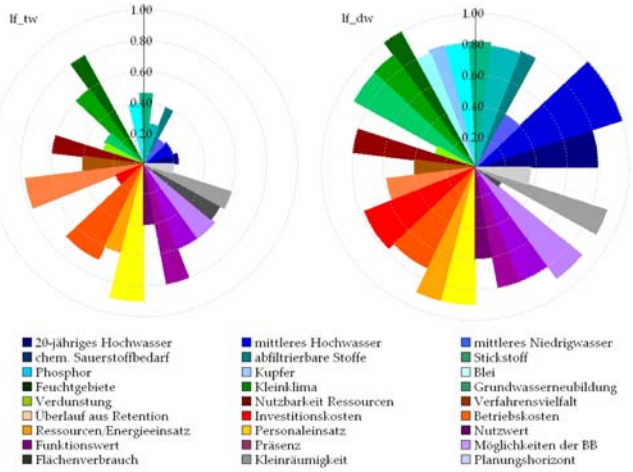


Helm 2007

Homogeneity Performance

For different Objectives

Conventional Sewer **SUDS**

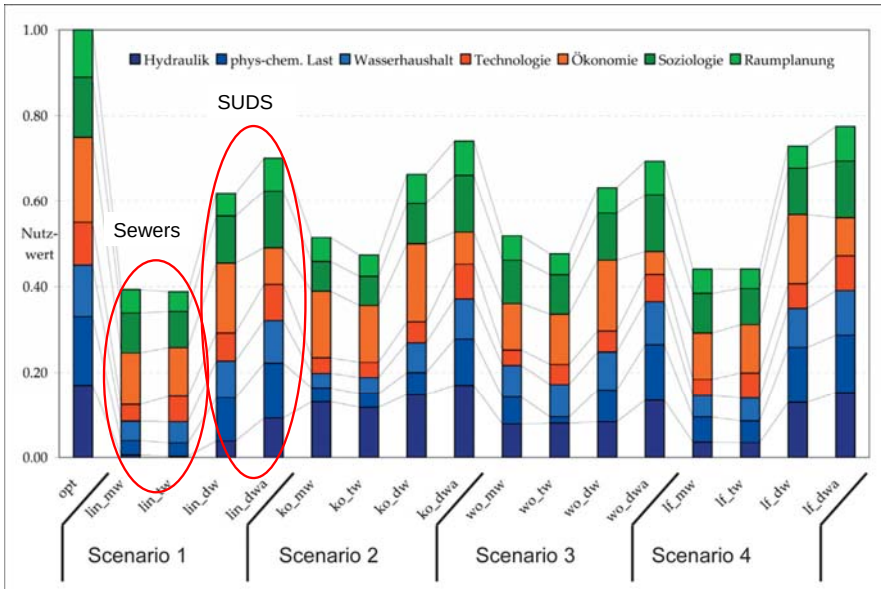


$$Hom = \begin{cases} 1 - \frac{\sigma}{tUV} & where\ \sigma \le tUV \\ 0 & where\ \sigma > tUV \end{cases}$$

$$\sigma = \sqrt{\sum_{i=1}^{n} w_i \left(pUV_i - tUV\right)^2}$$

Helm 2007

Case Study: Kupferzell Germany



Helm 2007

Measurement of Flexibility - Case Study Hamburg

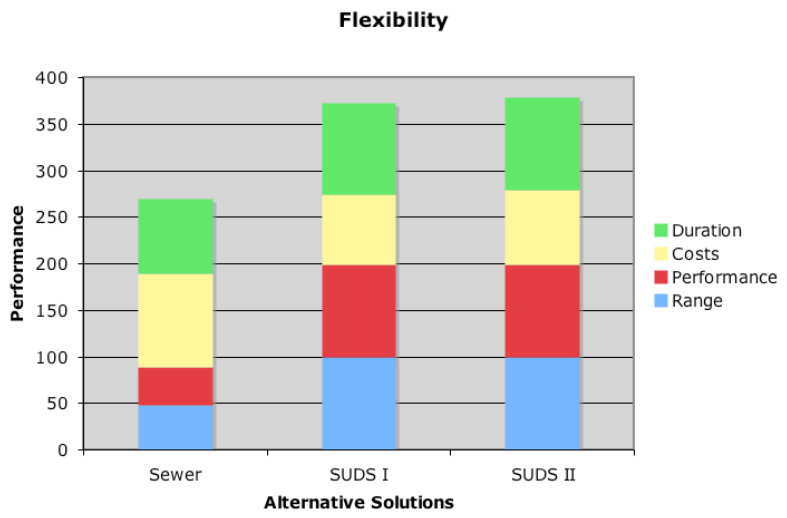
Residential area with 400 living units and total area of 17 ha

4 different future scenarios

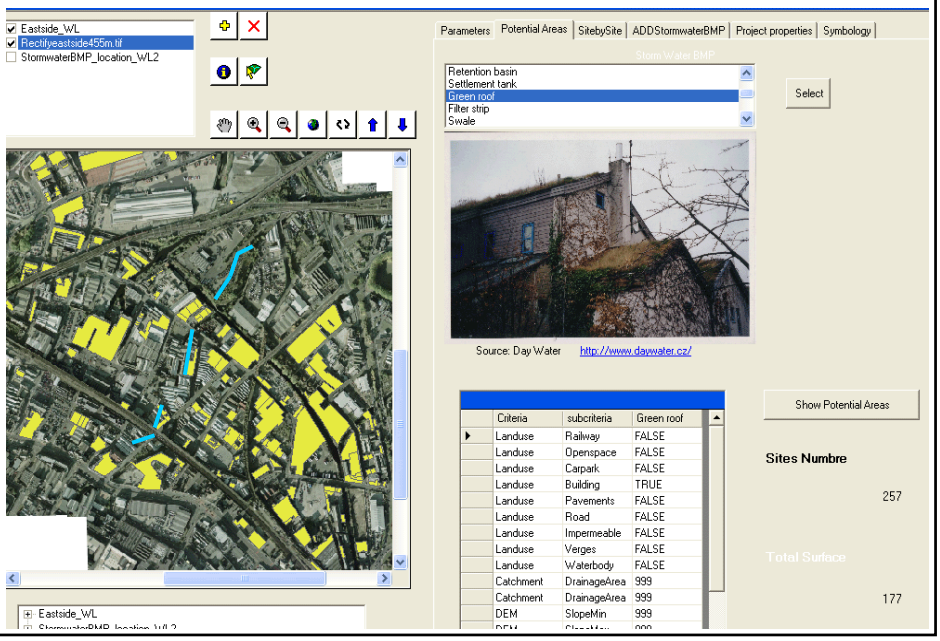
3 different alternative solutions

- **Conventional sewer systems**
- **SUDS I and**
- **SUDS II**

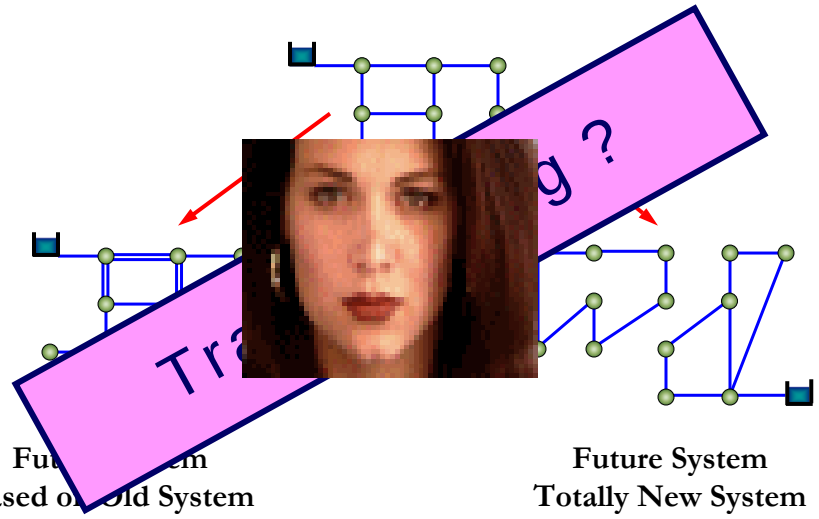
Comparing Flexibility of Alternative Solutions



Where / what to retrofit on-site???



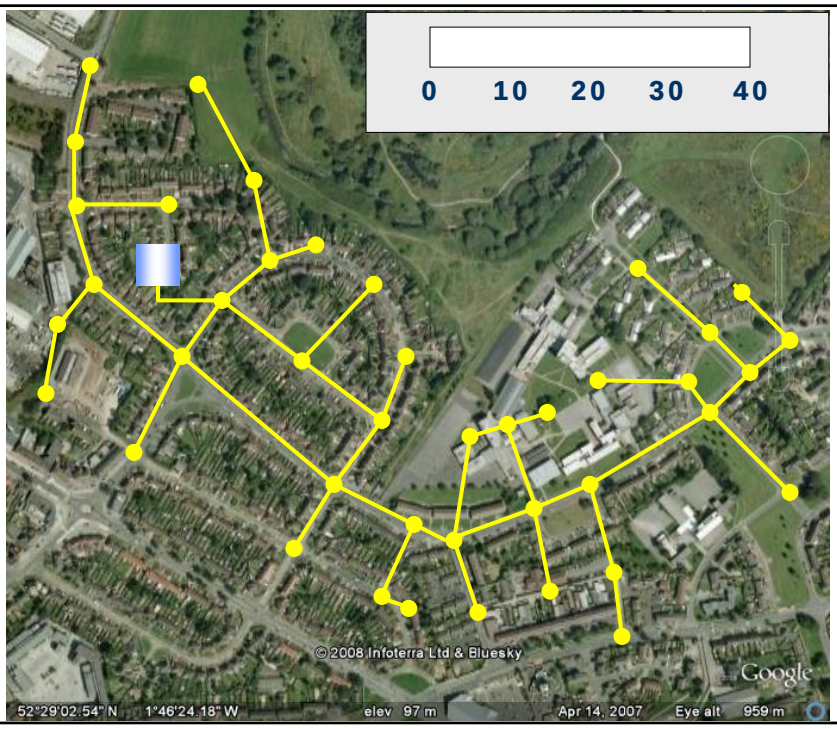
Transitioning

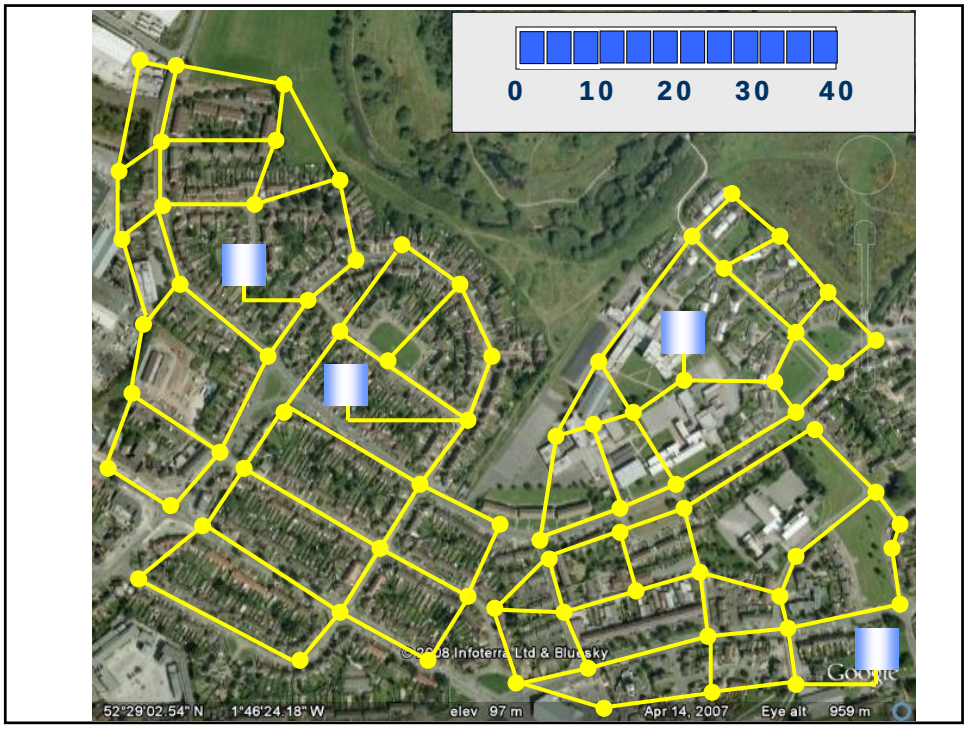


Future System
Based on Old System

Future System
Totally New System

Graph Theory Transition Systems

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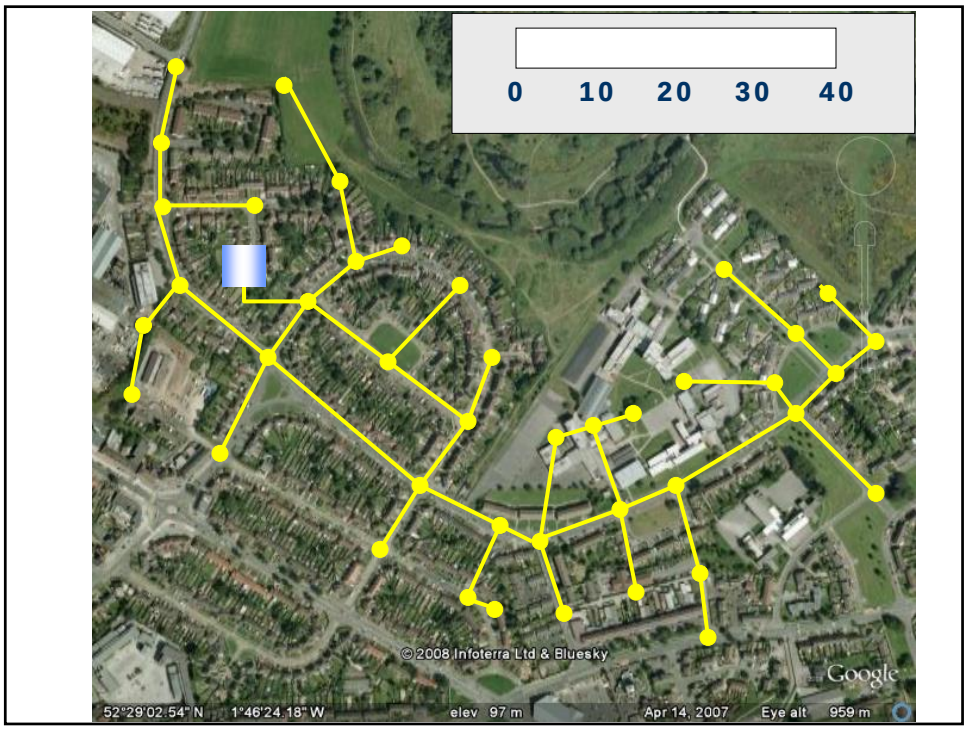
52°29'02.54" N 1°46'24.18" W elev 97 m Apr 14, 2007 Eye alt 959 m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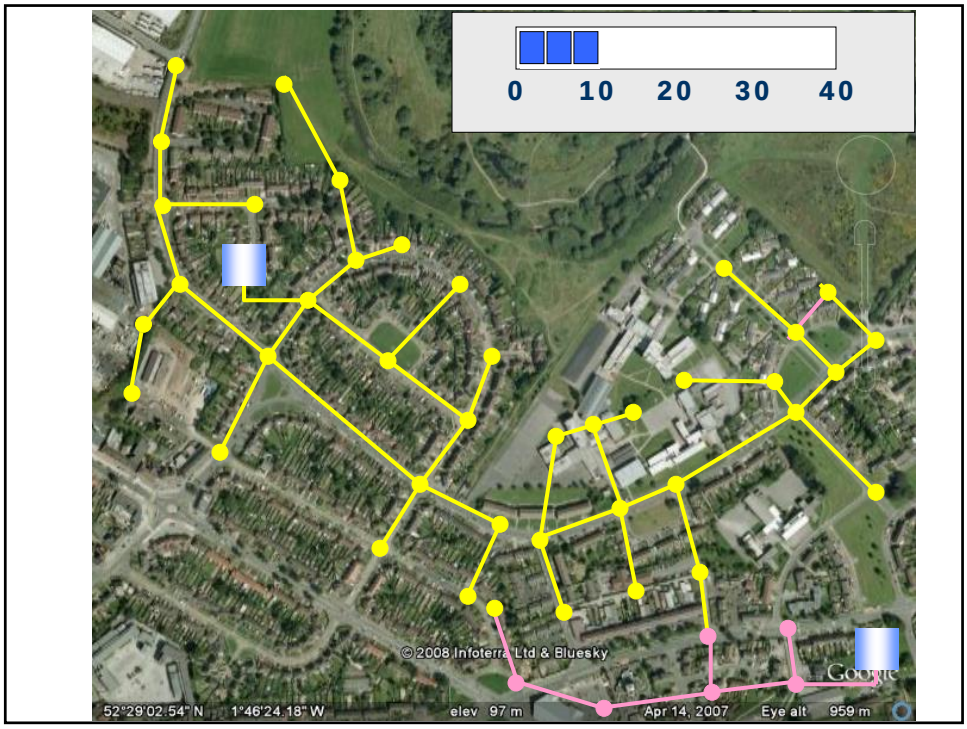
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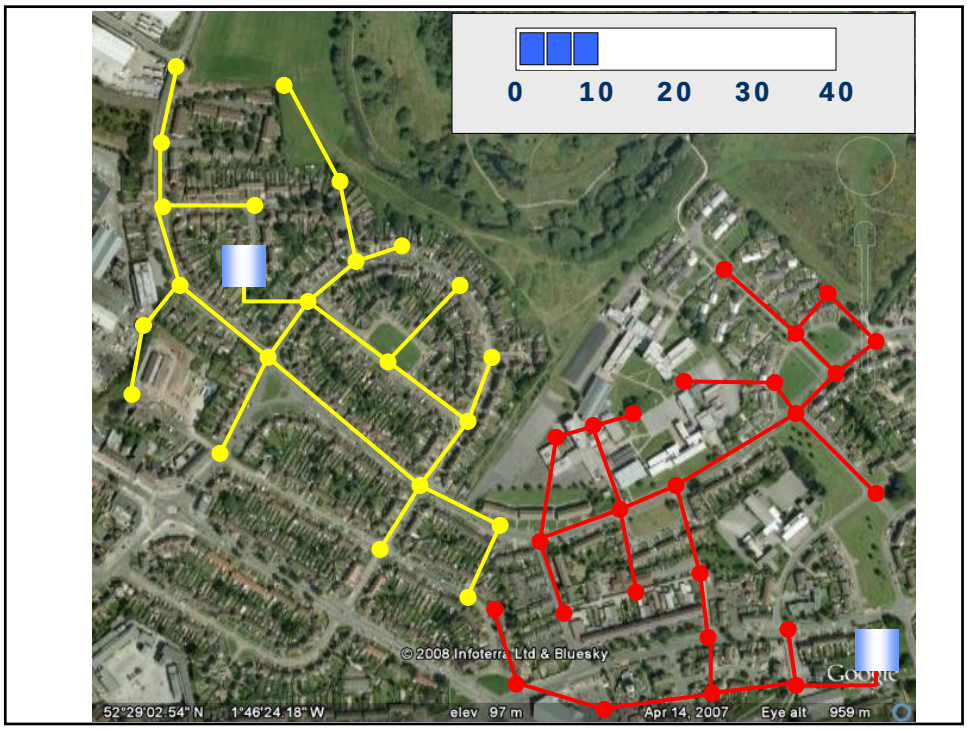
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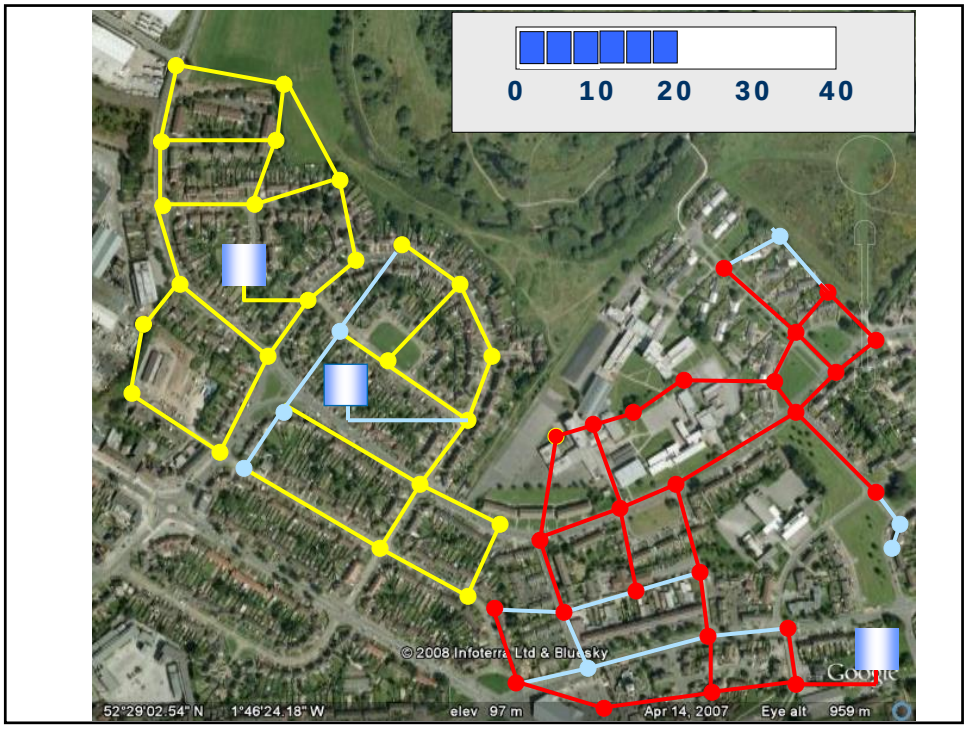
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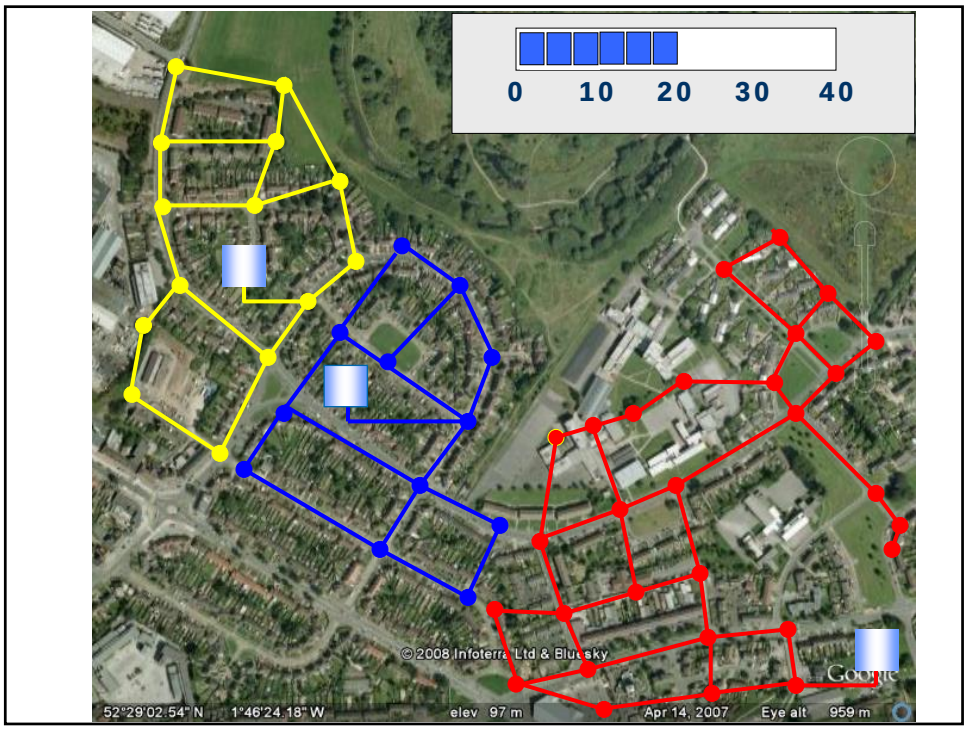
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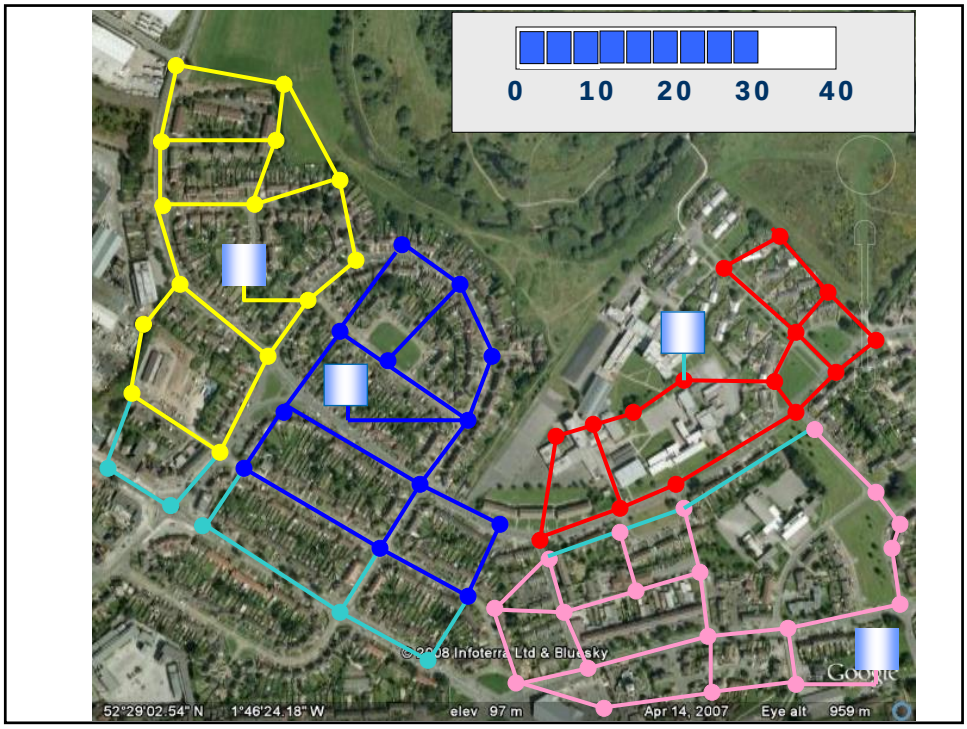
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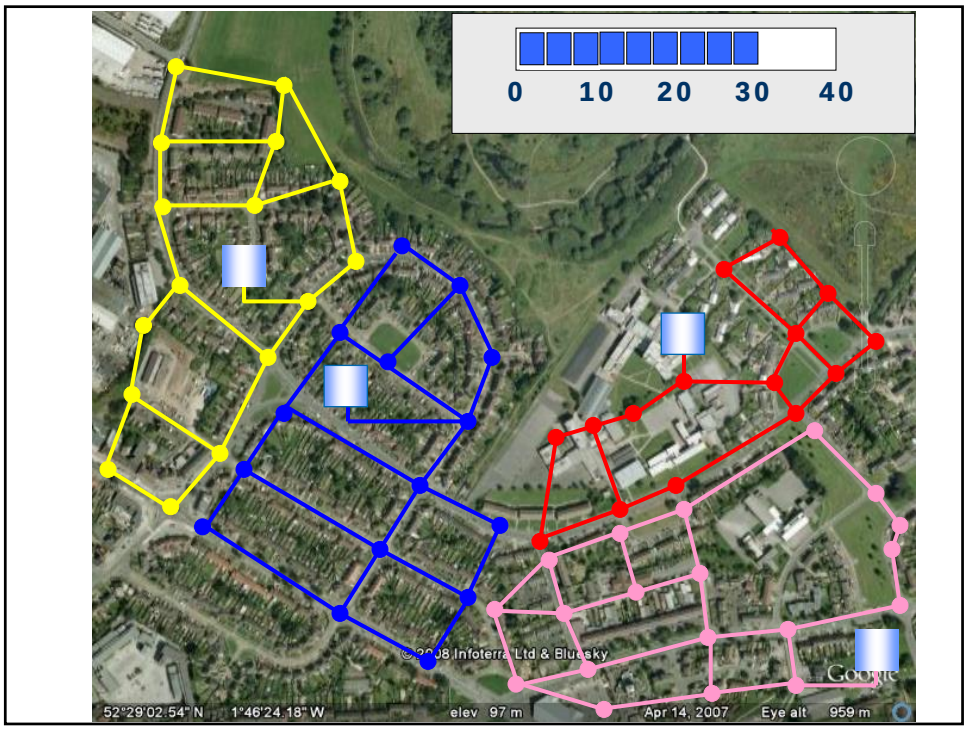
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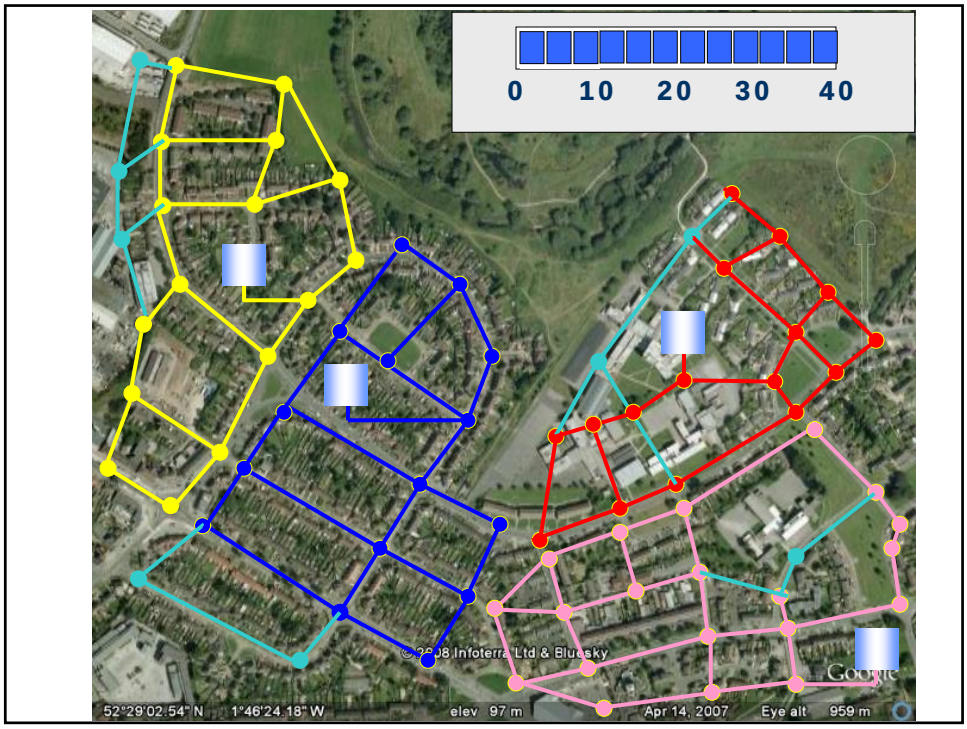
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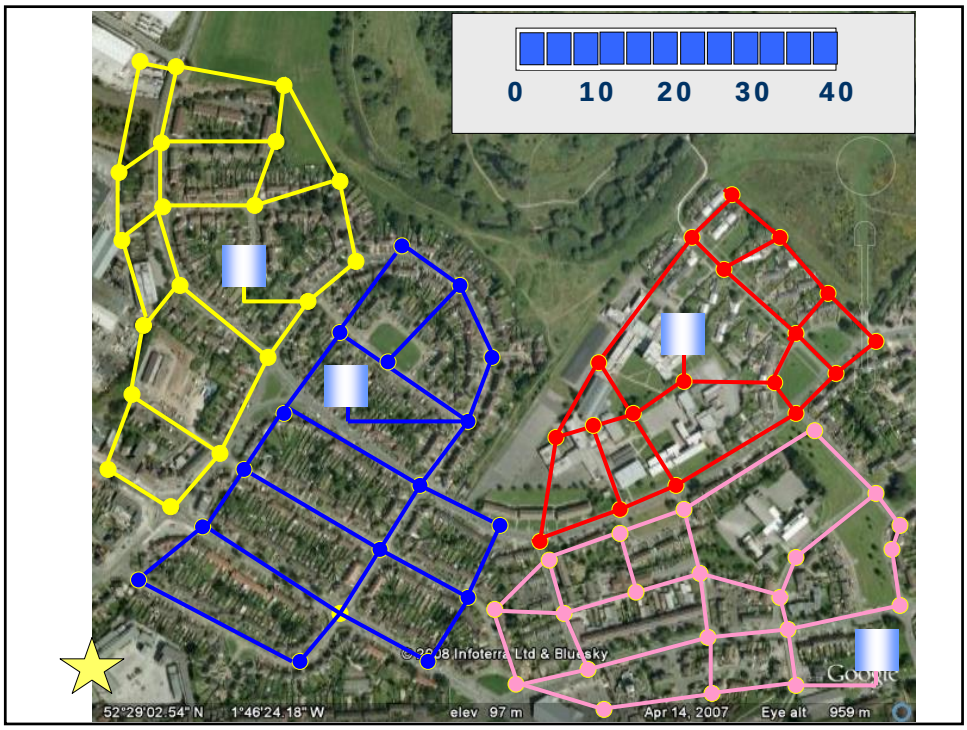
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52°29'02.54" N 1°46'24.18" W
elev 97 m
Apr 14, 2007
Eye alt 959 m

SWITCH Emscher - SUDS

Transition Emschersystem

Emscher River around ...

1890 **1980** **2010**

Emschergenossenschaft

Transitioning SUDS

Transition Emschersystem 1990

Emschergenossenschaft

Transitioning SUDS

Transition Emschersystem 2020

Emschergenossenschaft

Transitioning SUDS

Transition Emschersystem 1990

Emschergenossenschaft

Transitioning SUDS

Transition Emschersystem 2000

Emschergenossenschaft

Transitioning SUDS

Transition Emschersystem 2010

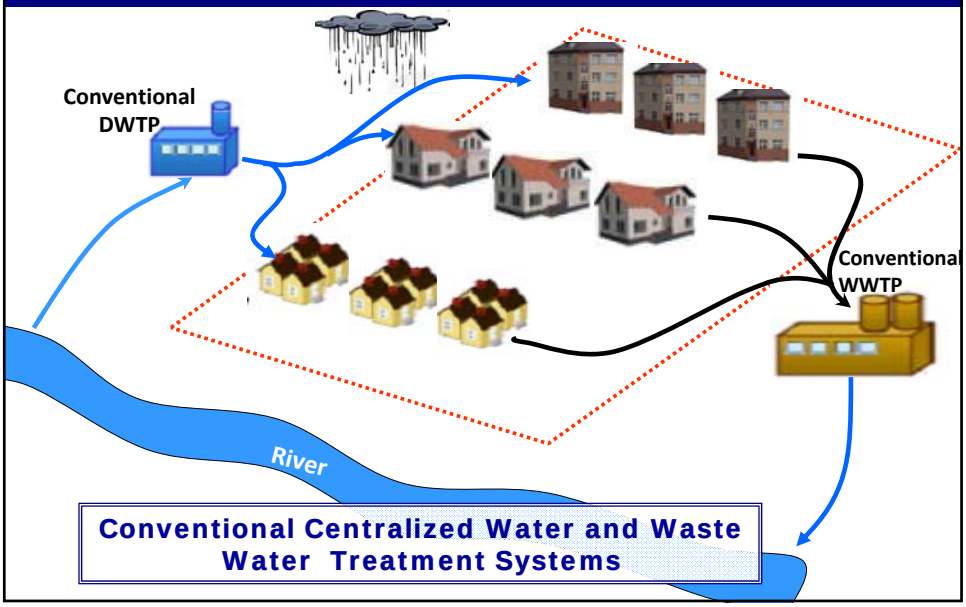
Emschergenossenschaft

Transitioning SUDS

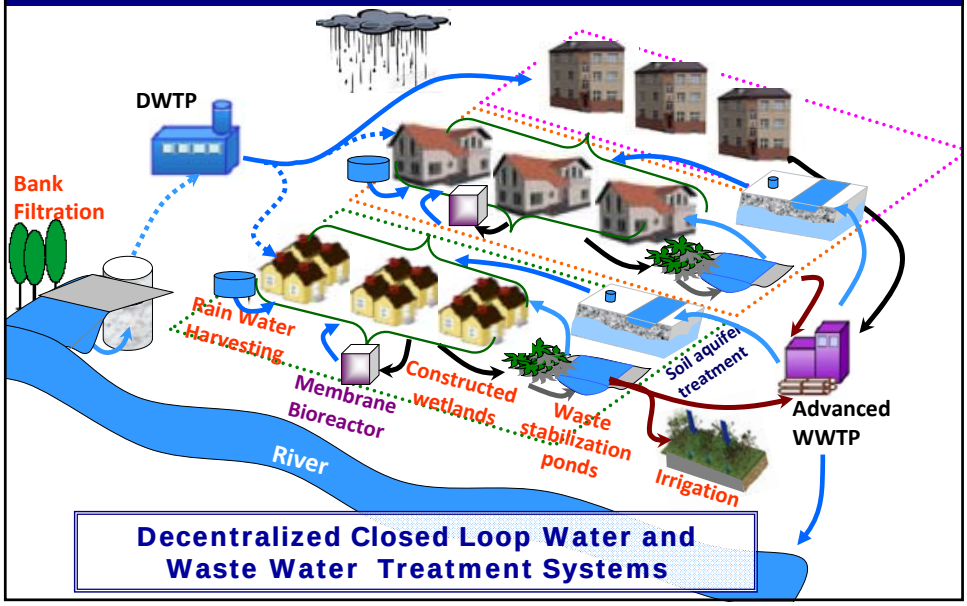
Transition Emschersystem 2020

Emschergenossenschaft

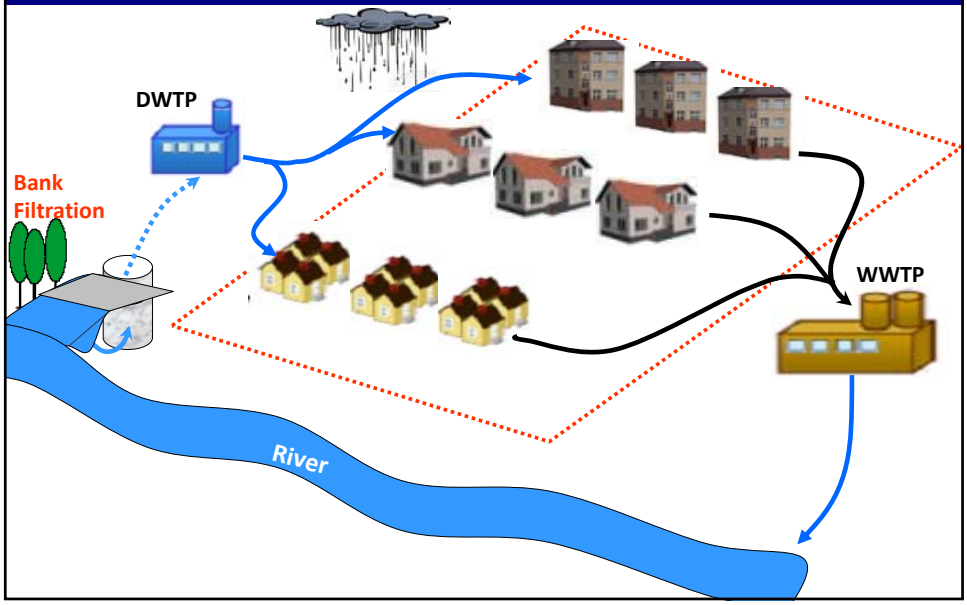
Transitioning -Treatment Systems



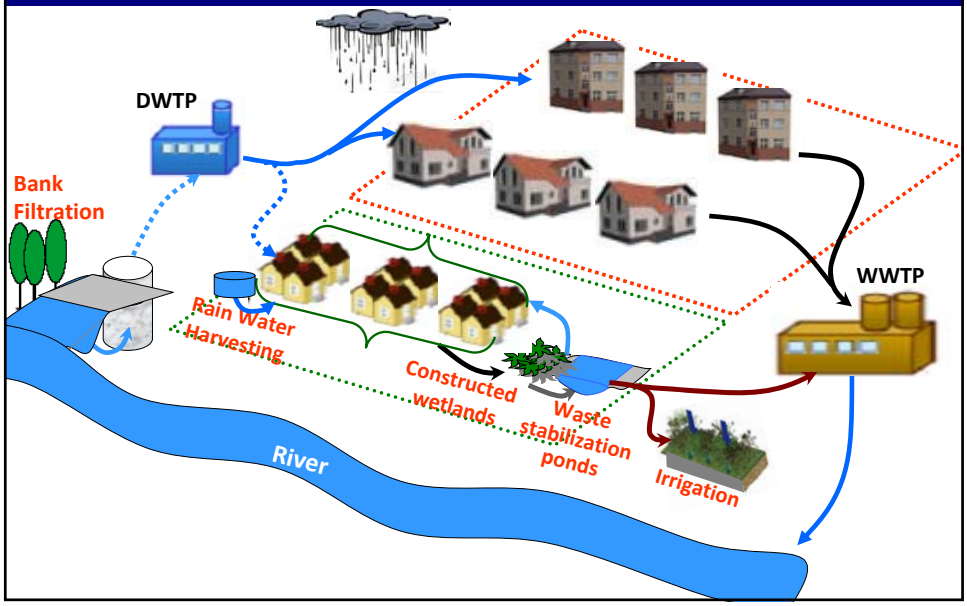
Transitioning -Treatment Systems



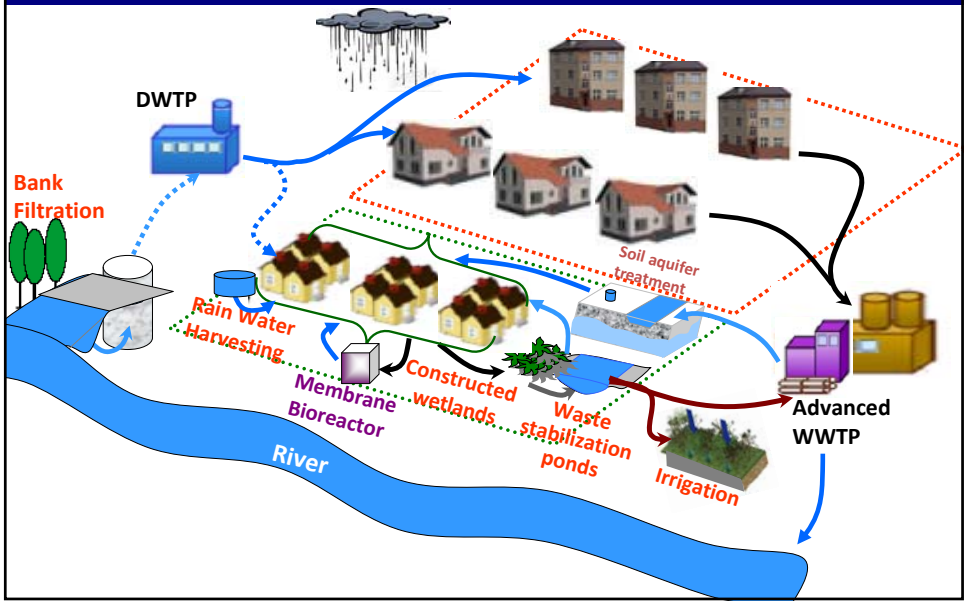
Transitioning -Treatment Systems



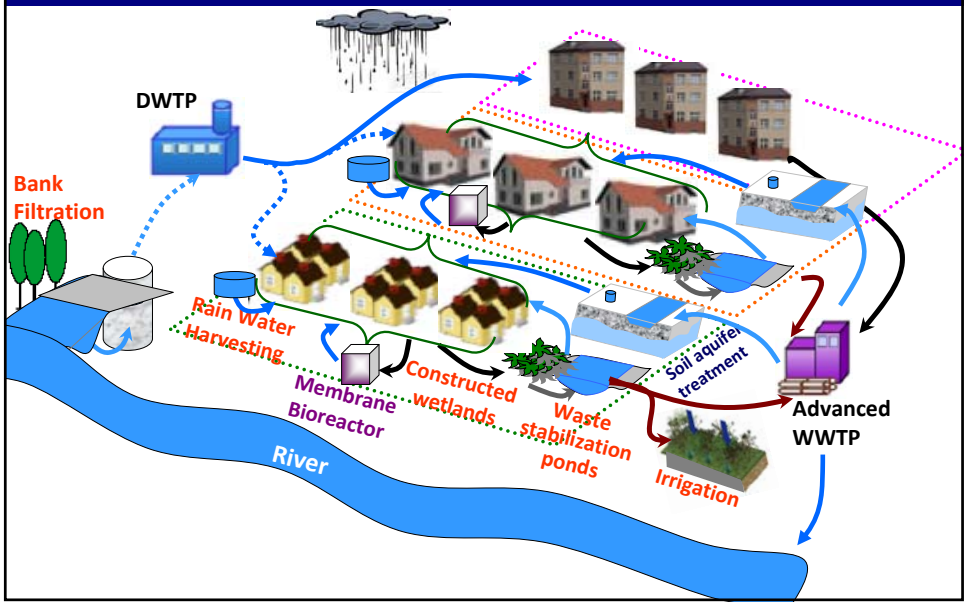
Transitioning -Treatment Systems



Transitioning -Treatment Systems



Transitioning -Treatment Systems

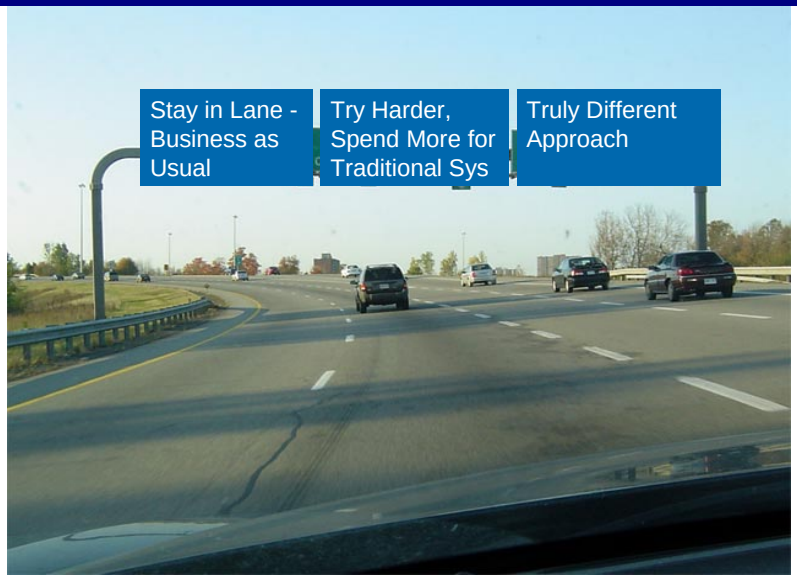


Summary

Summary

- We need to face the new challenges arising from the unprecedented changes taking place.
- Harmonization of approaches will require a different approach to planning and development (integrated, flexible, demand driven….)
- Sustainable and equitable solutions require locally-driven, incremental changes within a radical, wider shared vision
- Technology can make old solutions more efficient and durable – technologies combined we can achieve new system solutions

Choices Before Us



Thank You

Kalanithy Vairavamoorthy
Scientific Director of SWITCH-IP (EU-FP6)
vairavk@grad.usf.edu

Attachment 3
Sustainable Remediation Research in Environmental Engineering at USF

Sustainable Remediation Research in Environmental Engineering at USF

Sustainable Remediation Forum

February 4, 2011

Tampa, FL

USF Environmental Engineering & Water Resources Overview

- Air Quality
- Biological processes
- Contaminant fate & transport
- Green engineering
- Ocean turbulence
- Surface and subsurface hydrology
- Urban water infrastructure

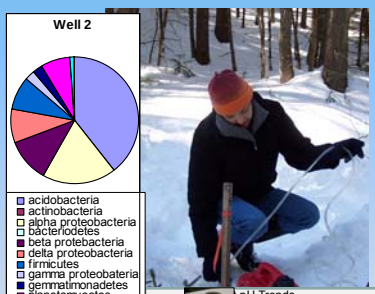
Attenuation of AMD by Fe(III) and Sulfate-Reducing Bacteria

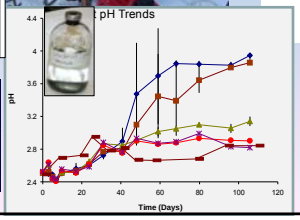
PIs: Richard Yuretich, David Ahlfeld, Sarina J. Ergas, Allan Feldman & Klaus Nüsslein

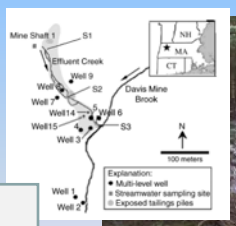
Sponsor: National Science Foundation

Students: Erika Lopez, Jaime Harrison, Merceditata Monserrate, Christina Stauber, Matt hew Coggon

- Investigates biological Fe(III) and SO_4^{2-} reduction at an AMD site in Massachusetts.
- Field studies, modeling, and laboratory experiments.
- Quantify the roles of acidophilic and acid-tolerant anaerobic microorganisms on the natural attenuation of AMD.







AMD at Davis Mine in Rowe, Massachusetts.

Perchlorate Remediation Using SUPeRB

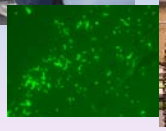
PIs: Sarina J. Ergas and Klaus Nüsslein

Sponsor: National Science Foundation

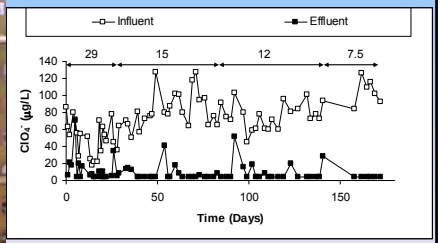
Students: Ashish Sahu, Teresa Conneely, Amber Boles and Robert McKeever

- Novel microbial metabolism couples elemental sulfur oxidation with perchlorate reduction.
- Advantages include perchlorate reduction to low levels with low biomass (sludge) production.
- Tests in upflow packed bed bioreactors along with studies of microbial ecology using molecular tools.
- Pilot studies carried out at the Massachusetts Military Reservation on Cape Cod

Teresa with pilot



FISH images of ClO_4^- reducing bacteria.



Perchlorate removal in a bench-scale bioreactor.

Remediation Strategies Influenced by Microbes

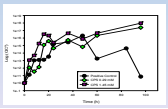
Student: Kathryn Bailey

Advisors: Sarina Ergas & Ann Miracle (PNNL)

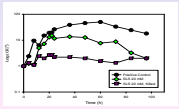
Sponsor: U.S. Department of Energy - Environmental Management, Office of Groundwater and Soil Remediation

Kathryn working in the anaerobic chamber to set up microcosms.

- 10 g Hanford vadose zone soil
- e-donor: sodium lactate
- e-acceptors: Tc(VII), Fe(III), calcium polysulfide

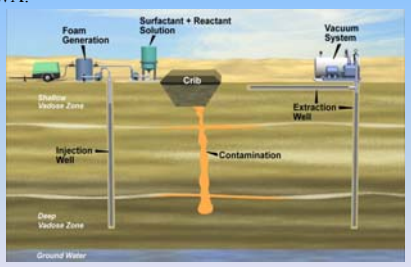


MR-1 may use CPS as an additional electron acceptor



MR-1 using SLS as a growth substrate.

- Scientists at PNNL have proposed the used of foam delivery technology to immobilize a pertechnetate [$Tc(VII)O_4^-$] plume in the vadose zone at Hanford Site, WA.
- The focus of this research is to determine the effects of microorganisms on the efficiency of foam delivery technology.
- *Shewanella oneidensis* MR-1 is used as a candidate organism for microbial reduction of technetium and will serve as a model of the indigenous microorganisms of the vadose zone.
- Toxicity studies conducted in bench-scale batch reactors in Richland, WA.



Foam delivery technology

S. oneidensis MR-1

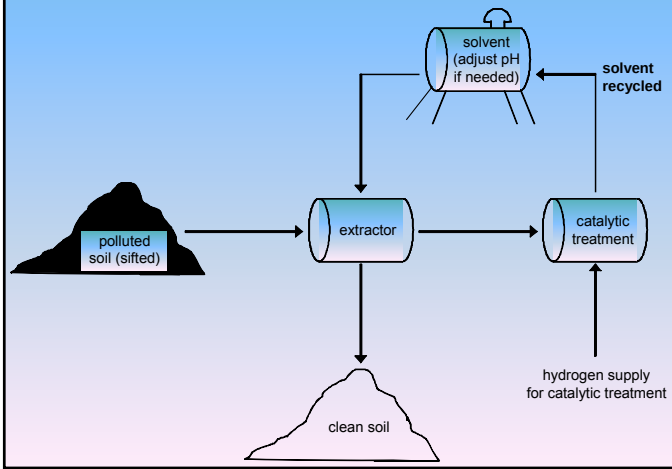
Soil Clean-up by Remedial Extraction and Catalytic Hydrodehalogenation (REACH)

PI: Jeffrey Cunningham

Sponsor: Texas Hazardous Waste Research Center (THWRC)

Students: Dr Hun-Young Wee, Claire Osborn, Jonathan Ticknor

- Remediation of soil contaminated by PCBs, pentachlorophenol, PCE/TCE, chlorinated benzenes, or other halogenated organics.
- Solvent extraction coupled with catalytic destruction of extracted contaminants.



- "Green" process:
  - Solvent is recycled in a closed loop
  - No secondary waste stream as with traditional solvent extraction (e.g., spent activated carbon)

Soil Clean-up by Remedial Extraction and Catalytic Hydrodehalogenation (REACH)

- Results from bench-scale REACH treatment of soil contaminated with 1,2,4,5-tetrachlorobenzene (TeCB) and pentachlorophenol (PCP)
  - Each batch of soil treated for 1 week
  - Solvent was mixture of water/ethanol
  - Catalyst was palladium (Pd) supported on porous alumina

Soil batch #	TeCB removal (%)	PCP removal (%)
1	96.5	83.2
2	98.7	90.5
3	98.3	90.2
4	96.5	83.7
5	94.4	81.8
6	90.0	93.2*
7	76.1	86.1

* Catalyst in the PCP system was regenerated before treatment of soil batch #6

Building Community Engagement & Resilience Water Awareness Research and Education

PIs: Maya Trotz, Trent Green, Amy Stuart, & Fenda Akiwumi

Sponsor: Environmental Protection Agency

Students: Joniqua Howard, Ken Thomas, Erlande Omisca, Daniel Soledade, Engineers for a Sustainable World

- Builds sustainable model for P-20 and community partnership to raise environmental awareness, improve livelihoods and health & protect water bodies.
- Field studies, laboratory experiments, K-12 curriculum, community outreach.






7 square mile area, 31 stormwater ponds, Brownsfield sites.

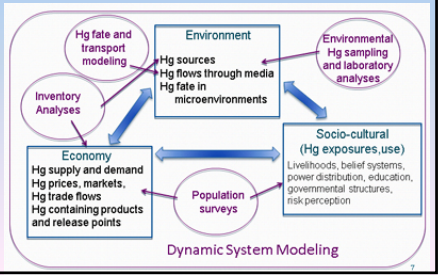
Sustainable Healthy Communities: Mercury in Tampa Bay, Guyana and Bolivia

PIs: Amy Stuart, Maya Trotz & Fenda Akiwumi

Sponsor: State of Florida, USF Sustainable Healthy Communities

Students: Joniqua Howard, Ryan Michael, Trina Halfhide

- Understanding and promoting sustainability related to mercury exposures through integrated research, graduate education, and community involvement.
- Field studies, modeling, and laboratory experiments.



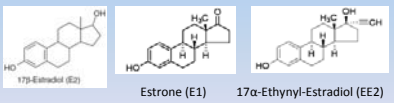
Anaerobic Membrane Bioreactor for Landfill Leachate Treatment

PI: Daniel Yeh

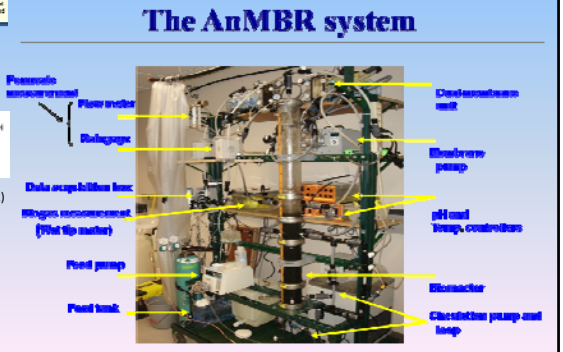
Sponsor: Hinkley Center for Solid & Hazardous Wastes Management

Students: Anh Do, Ana Prieto, others

- Development of technology for landfill leachate pretreatment
- Targeting removal of trace organic compounds such as 17β-estradiol and other estrogens
- Collaboration with FSU on integrated AnMBR UV process



Estrone (E1) 17α-Ethynyl-Estradiol (EE2)



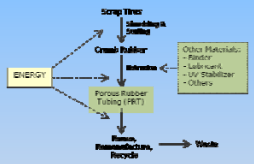
Scrap Tire-derived Porous Rubber Tubing for Water Filtration

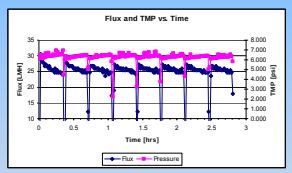
PI: Daniel Yeh

Sponsor: Hinkley Center for Solid & Hazardous Wastes Management

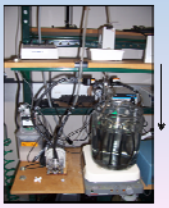
Students: Ana Garcia, David Starman, Joice Gomez, others

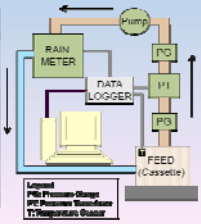
- Turning an ubiquitous solid waste problem into a beneficial secondary product
- Assessment of water filtration performance as low cost membrane
- Assessment of environmental sustainability and life cycle

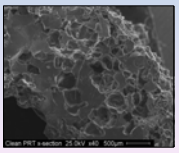




Reactor Configuration







before after

International Partnership

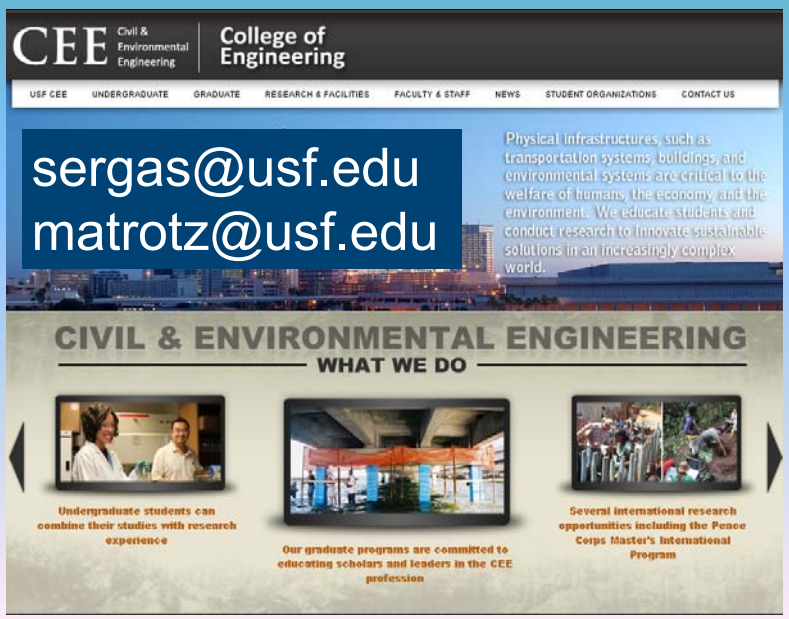
European Union's Erasmus Mundus Joint doctoral degree on "Environmental Technologies for Contaminated Solids, Soils and Sediments (ETeCoS^3)

Students study at three universities within network

USF is the only US university in the network

Example research topics:
•Heavy metal removal from soils and sediments
•Advanced oxidation coupled with biological processes for recalcitrant organic pollutants
•Anaerobic digestion of contaminated solids

Questions?


CEE Civil & Environmental Engineering | College of Engineering
USF CEE
UNDERGRADUATE
GRADUATE
RESEARCH & FACILITIES
FACULTY & STAFF
NEWS
STUDENT ORGANIZATIONS
CONTACT US
sergas@usf.edu
matrotz@usf.edu
Physical infrastructures, such as transportation systems, buildings, and environmental systems are critical to the welfare of humans, the economy, and the environment. We educate students and conduct research to innovate sustainable solutions in an increasingly complex world.
CIVIL & ENVIRONMENTAL ENGINEERING
WHAT WE DO
Undergraduate students can combine their studies with research experience
Our graduate programs are committed to educating scholars and leaders in the CEE profession
Several international research opportunities including the Peace Corps Master's International Program

Attachment 4
Florida Department of Environmental Protection's Role in Phosphate Mining

Florida Department of
Environmental Protection

DEP's Role in Phosphate Mining

Bureau of Mining and Minerals Regulation
Michelle Sims, Environmental Administrator

Overview

- Evolving Regulatory Requirements
- Peace River Cumulative Impact Study Findings
- Field Wetland Evaluation
- Wetland Comparison
- Regulatory Requirements
- Current Expectations

Phosphate overview

- Phosphate mining disturbs approximately 5,000-6000 acres of land per year, resulting in extraction of about 30 million metric tons of phosphate rock.
- About 25-30% of these lands are wetlands. Under state law all lands mined after 1975 must be reclaimed to a beneficial use, and wetlands must be restored acre-for-acre and type-for- type.
- Since 1975 and as of December 31, 2009, about 187,215 acres have been mined. About 132,867 acres (both uplands and wetlands) or 71% of these lands have been reclaimed.
- Clay settling areas are utilized at most mines to store highly colloidal clays separated from the ore matrix during initial processing (beneficiation). These settling areas may cover up to 40% of a mine area.
- The DEP is working with the phosphate industry to reduce the acres of clay settling areas at new mines.

Three Types of Phosphate Mined Land

- Pre-1975 mining
- Pre-1995 (Pre-ERP) mining
- Present day practices

Non-Mandatory Land Reclamation - Phosphate severance prior to July 1, 1975

- At least 149,129 acres are considered Nonmandatory
- No regulatory requirement to reclaim (unless redisturbed)
- CSA, STA, MOA, HMA
- Properties can consist of impounded water, nuisance exotic vegetation, mining debris and structures, and steep slopes. Functioning wetland and sandhill inclusions can exist on these properties as well.

Nonmandatory continued

Reimbursement program for owners of eligible lands who applied prior to January 1, 2005

Total Non-mandatory Reclamation Eligible Acres: 73,191 *

As of January 31, 2010:

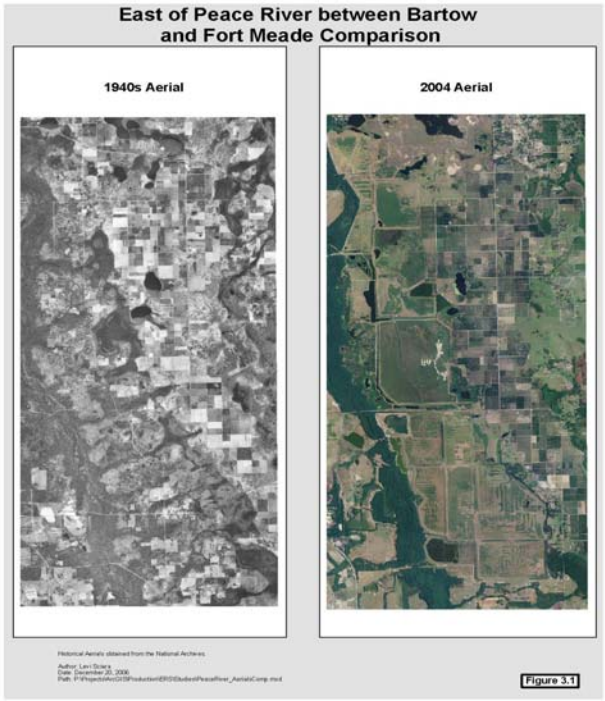
- 44,552 acres reclaimed and released (60.9% completed)
- 8,337 acres in currently funded reclamation programs (11.3% in progress)
- 5,036 acres for remaining eligible lands (w/ application filed by the deadline of January 1, 2005).

Pre-1995

- Must reclaim acre for acre, type for type
- Reclamation predominately accomplished through land and and lakes reclamation
- 1984 Wetland Resource Permit requirements for connected wetlands only

Present Day Practices

- Requirement to reclaim for every acre including every foot of stream
- ERP brings full mitigation requirements for wetland impacts for connected and isolated wetlands
- More emphasis on hydrology and wildlife corridors
- Other Agency Authorizations



Peace River Cumulative Impact Study

- Chapter 2003-423 LOF
- Peace River Cumulative Impact Study
  - Urban development, agricultural operations, and mining have all contributed to the basin's decline.
  - Documented wetland, stream and native upland habitat losses
- Created the Peace River Basin Resource Management Plan and Recommendations

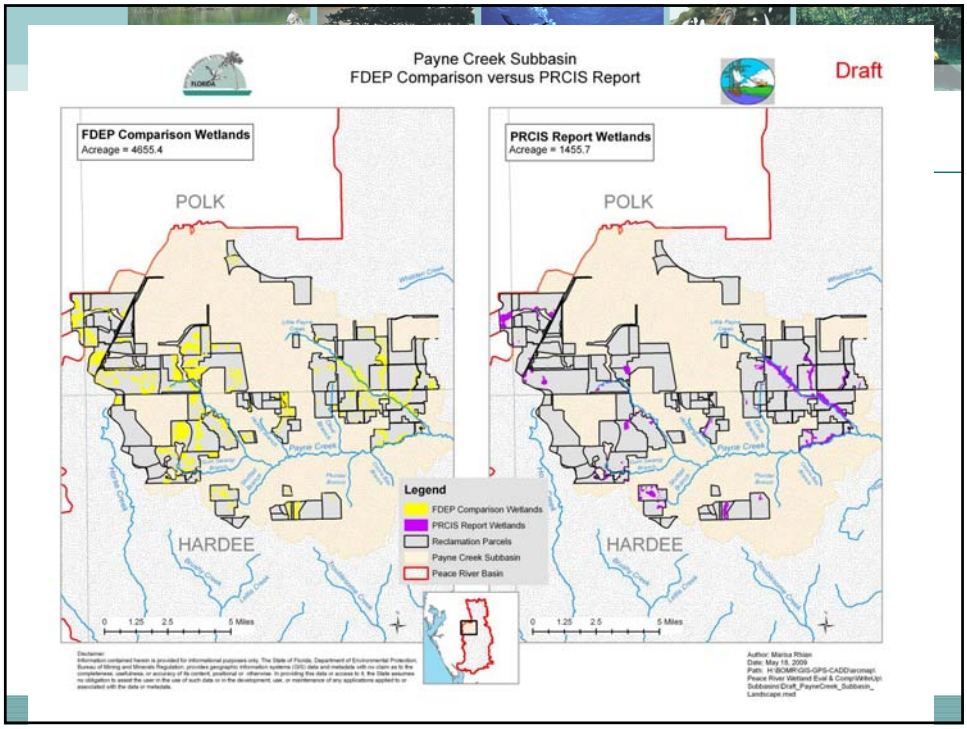
- PRCIS showed:
  - 38.5% wetland acreage loss in the Peace River Basin from the 1940's to 1999
  - Loss of 31,000 acres after 1979 despite regulations
- DEP memo to conduct internal wetland audit
  - Wetland Acreage Comparison
  - Field Evaluation
- Revisiting of wetland evaluation will ensure more accurate accounting of wetlands status in Peace River Basin

Wetland Comparison Study

Wetland Comparison Study: Report – Results

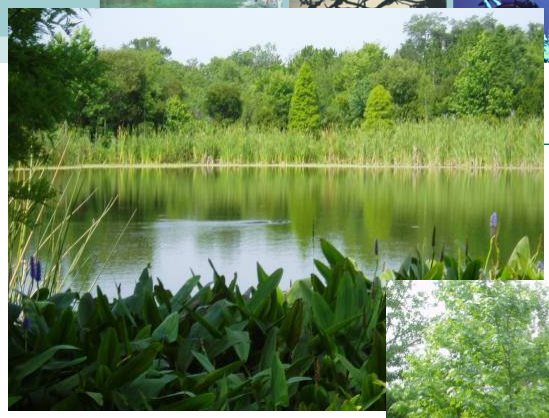
Verification is only of wetlands occurring on Mandatory Phosphate Lands NOT of the entire 31,000 acres lost in the basin since 1979.

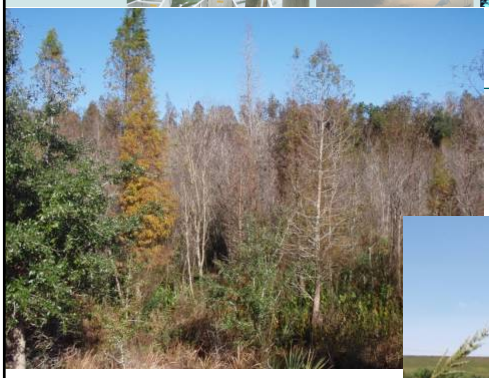
SubBasin	PRCIS Report - Acres	FDEP Comparison– Acres
Peace at Bartow	290.5	355.9
Peace at Zolfo Springs	2,415.1	3,705.9
Payne Creek	1,455.7	4,655.4
Horse Creek	533.0	958.6
TOTAL	**4,694.3**	**9,675.8**



Wetland Evaluation Study

- 121 sites visited
- Average "Bone Valley Score" is 0.57
- Mines reclaimed with "newer" techniques/regulatory obligations scored higher on average

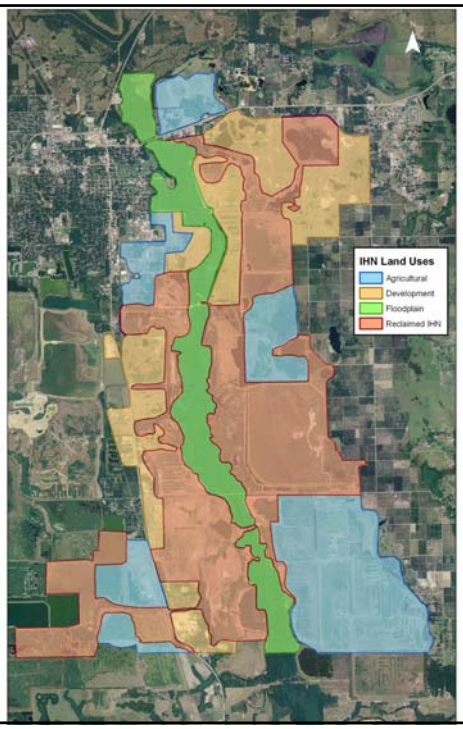




Mine	Avg of UMAM Total Score
Bonny Lake	0.48
Cargill Fort Meade	0.53
Clear Springs	0.65
Fort Green	0.69
Four Corners Lonesome	0.48
Exxon/Mobil Fort Meade	0.55
Noralyn Phosphoria	0.74
North Pasture	0.71
Payne Creek	0.60
Rockland	0.49
Saddle Creek	0.43
Silver City	0.30
South Fort Meade	0.81
Watson	0.46

Current Expectations

- Extensive review of ERP and CRP applications
  - Technical review for hydrology pre- and post- mining
  - Field reviews for thorough habitat assessment
  - Look for stream restoration opportunities or the addition of riparian areas through mine authorization
- Elimination and reduction of wetland impacts
- Reduce the acres of clay settling areas at new mines
- Preservation and Conservation areas
  - Integrated Habitat Network Consideration and Buffers



Reclamation Requirements	Example ERP Standards (Conditions vary by permit)
Acre for Acre/Type for type	Uniform method to assure no functional wetland loss
Linear foot replacement	Sinuosity/Macro-invertebrate standards/Construction standards
Maintain watershed acreage	Maintain or improve watershed function Conservation Easements
200 trees per acre	400 trees per acre Construction standards including mucking/top-soiling Canopy coverage Similarity requirements to reference sites Nuisance/exotic density standards
Establishment Periods 1 year upland trees 3 years herbaceous wetland 5 years forested wetland	Until all permit success criteria are met- regardless of reclamation release
Annual Report for Mining /Reclamation acreage accounting/Financial Assurance	Monitoring reports for Hydrology/Vegetation accounting

Hickey Branch

RCS-4(B)

DB-5

Thank You!

DEP – Bureau of Mining and Minerals Regulation:
http://www.dep.state.fl.us/water/mines/index.htm

Peace River Basin Management Advisory Committee:
http://www.dep.state.fl.us/water/mines/prbmac.htm

Peace River Cumulative Impact Study:
http://www.dep.state.fl.us/water/mines/pr_cis.htm

Contacts:

Michelle Sims, Environmental Administrator-Environmental Resources Section (863) 534-7077

Orlando Rivera, Program Administrator-Mandatory Phosphate Section (850) 488-8217

Attachment 5
Land Reclamation and Water Issues in the Phosphate Industry

Land Reclamation and Water Issues in the Phosphate Industry

SURF 16

University of South Florida

February 3, 2011

Brian Birky, Ph.D.

Research Director – Public & Environmental Health

Steven Richardson, Ph.D.

Research Director – Reclamation

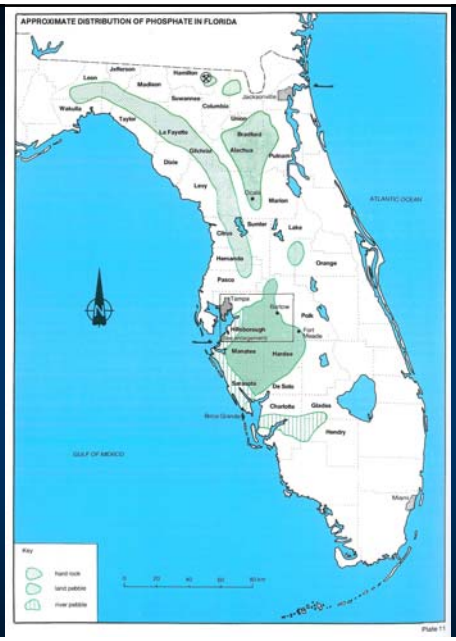
USF Polytechnic - Florida Industrial and Phosphate Research Institute

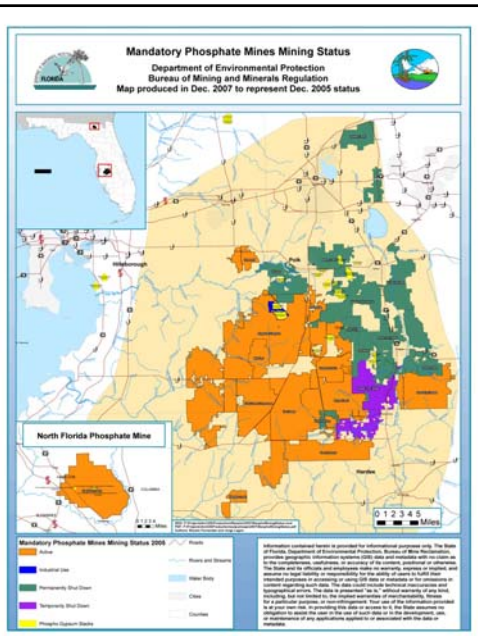
US Phosphate Rock Sources

- Florida, North Carolina, Southeastern Idaho, Western Wyoming, Northern Utah…
- Little imported
  - Morocco
  - Bayovar Mine in Peru (future)
- Processing is by the wet acid method
  - Florida, North Carolina, Louisiana, Texas
- Elemental P in Soda Springs, ID

US Phosphate Rock Production

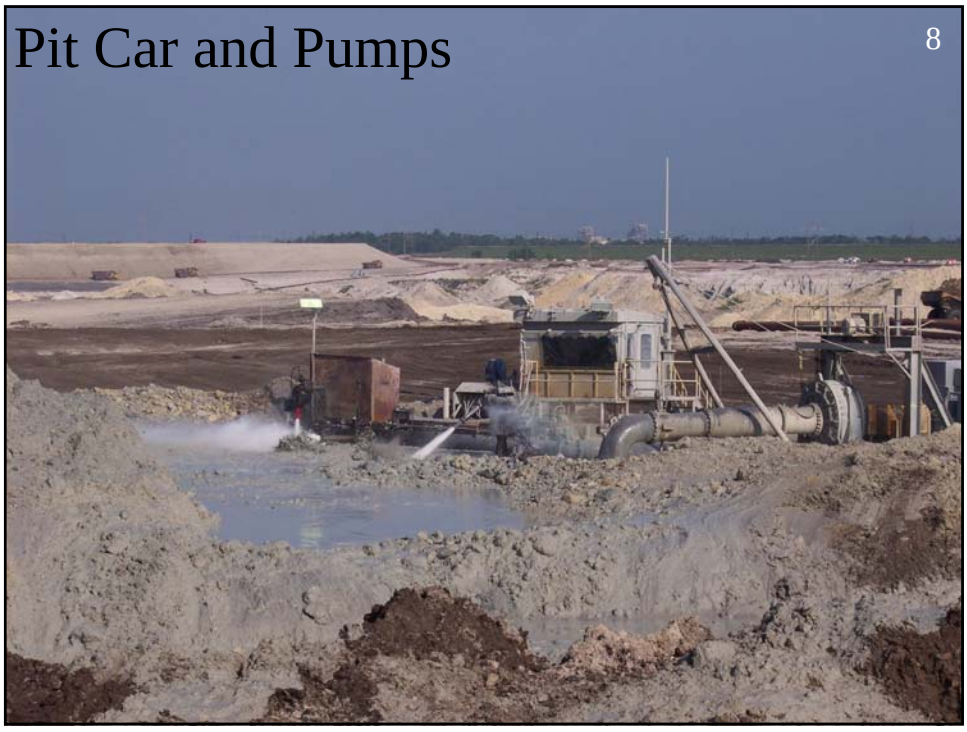
- Production has declined in the past three decades
  - From a peak of over 53 million tonnes in 1980 (38.5% of world)
  - To a little over 26 MT in 2009 (16.6% of world)


APPROXIMATE DISTRIBUTION OF PHOSPHATE IN FLORIDA
Jefferson
Leon
Madison
Hamilton
Suwannee
Columbia
Union
Bradford
Alachua
Putnam
Dixie
Gilchrist
Levy
Marion
Citrus
Sumter
Lake
Hernando
Orange
Pasco
Tampa
Polk
Hillsborough
Manatee
Hardee
Sarasota
De Soto
Charlotte
Glades
Hendry
Miami
ATLANTIC OCEAN
GULF OF MEXICO
Key
hard rock
land pebble
river pebble


Mandatory Phosphate Mines Mining Status
Department of Environmental Protection
Bureau of Mining and Minerals Regulation
Map produced in Dec. 2007 to represent Dec. 2005 status
North Florida Phosphate Mine
0 1 2 3 4 5
Miles
Mandatory Phosphate Mines Mining Status 2005
Active
Industrial Use
Permanently Shut Down
Temporarily Shut Down
Phospho Gypsum Stacks
Roads
Rivers and Streams
Water Body
Cities
Counties

Dragline and Mine Pit

Pit Car and Pumps



Mined Land

9

Sand Tailings Backfill

10

Active Clay Settling Area

11

Active Clay Settling Area

12

Water Related Studies Funded by the Institute

- Over 70 studies
- Covering a wide range of topics
  - Clay settling areas
  - Process water
  - Wetlands and streams
  - Many more
- Available online: http://fipr.poly.usf.edu/

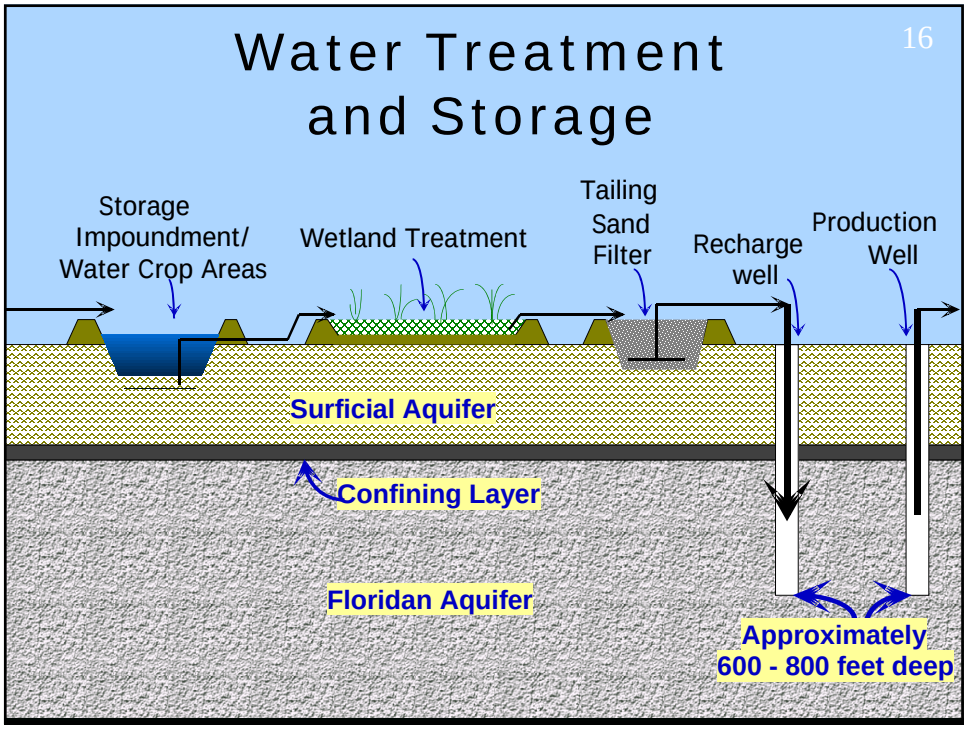
Hydrology

- FIPR Hydrologic Model (FHM)
- Hydrologic databases and models for:
  - Clay settling areas
  - Other mined lands
  - Complex basins (mined and unmined lands)
  - Phosphogypsum stacks
- Water treatment - wetlands, sand filter
- Mining impact on streamflow
- Stream restoration

Hydrology (Cont.)

- FIPR Hydrologic Model (FHM)
  - Reclamation design
  - Assess impacts
- Integrated Hydrologic Model (IHM)
  - Used by Tampa Bay Water and SWFWMD

Water Treatment and Storage



Water Treatment on Mined Lands

Reduced by wetland and sand filter:

- Sulfate
- Nitrate
- Phosphorus
- Arsenic
- pH
- Temperature
- Dissolved Oxygen (DO) and Oxidation-Reduction Potential (ORP)

Water Treatment on Mined Lands: Wetland Treatment and Sand Tailing Filtration

- All primary drinking water standards met except coliform bacteria
  - Sand filter greatly reduced coliform
  - UV treatment assured compliance
- All secondary standards met except
  - Fe, Mn, F, color, odor
  - Similar to shallow groundwater in the area


19
Wetlands on CSAs


20
Stream Restoration
Hydrology and Biology

Phosphatic Clay to Control Red Tide

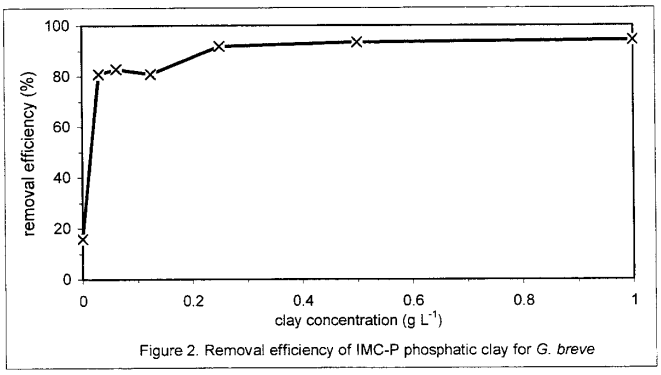
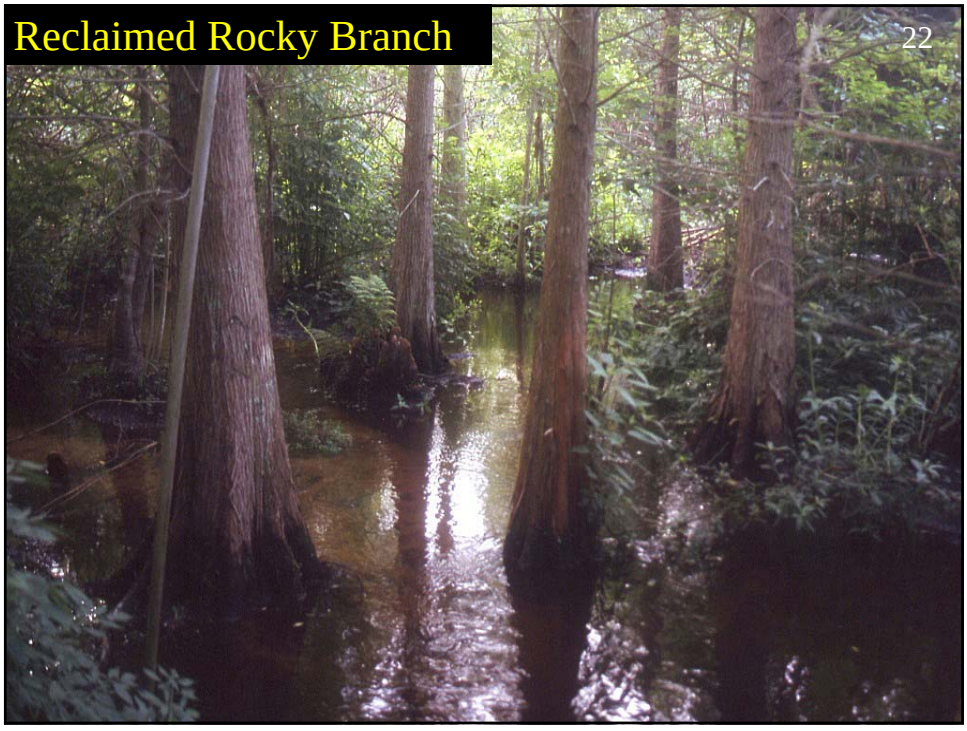


Figure 2. Removal efficiency of IMC-P phosphatic clay for *G. breve*

Reclaimed Rocky Branch



Reclaimed Clay Settling Areas: Uses

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Crops on Clay Settling Area

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Energy Crops

25

Eucalyptus Plantation on Clay Settling Area

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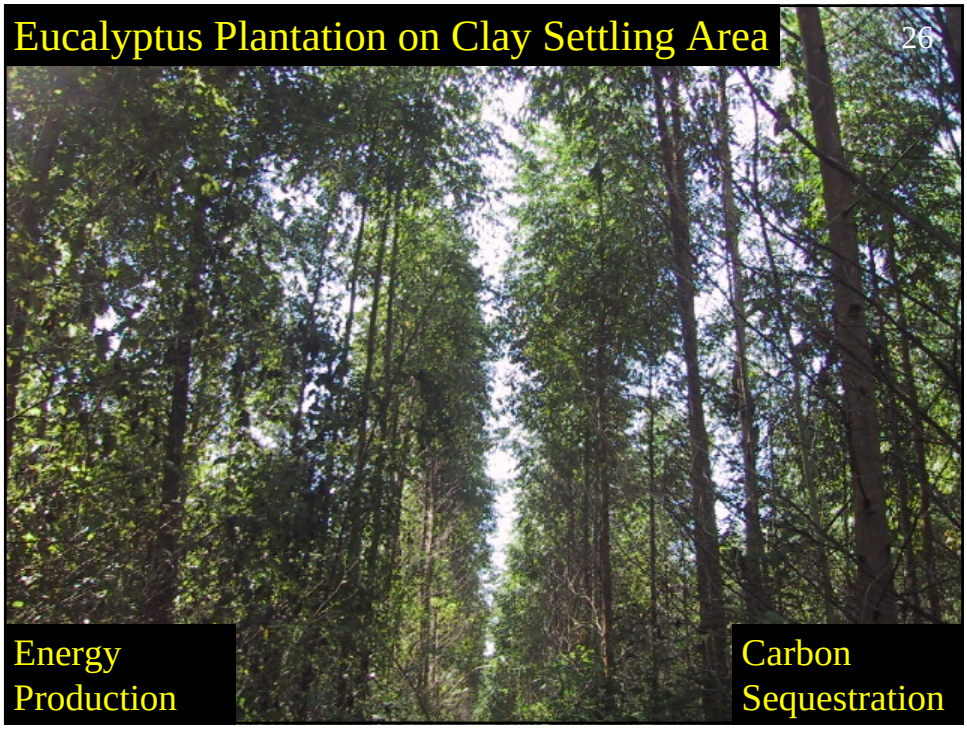

Energy Production

Carbon Sequestration

Mining Impacts

Phil Chapman
Photographer
Tenoroc

Radioactivity in Central Florida Lakes

	Natural Lake	Reclaimed Lake	EPA DW Standard
Ra-226 in water (pCi/liter)	0.3	0.3	5
Ra-226 in sediment (pCi/g)	1.7	13.3	---
Rn-222 in water (pCi/liter)	2.2 – 8.1	7.6 - 119	---
Gross alpha (pCi/liter)	1.2	1.25	15
Gross beta (pCi/liter)	7.6	4.2	table

29

30

Consumption of Fish from Pit Lakes

- Conclusions
  - No observable evidence of significant mining impacts for the study parameters as they impact consumability of finfish
  - No statistical difference in radionuclides or metals except for mercury
  - Mercury was found to be higher in the natural non-impacted lakes

Chemical Processing Impacts

Phosphogypsum Stack

Phosphogypsum Stack Closure

- Vegetation cover on phosphogypsum
  - With or without soil
  - Excellent quality of runoff
- Alternative cover systems
- Alternative hydrologic barrier layers
- Water balance
- Influenced DEP rules

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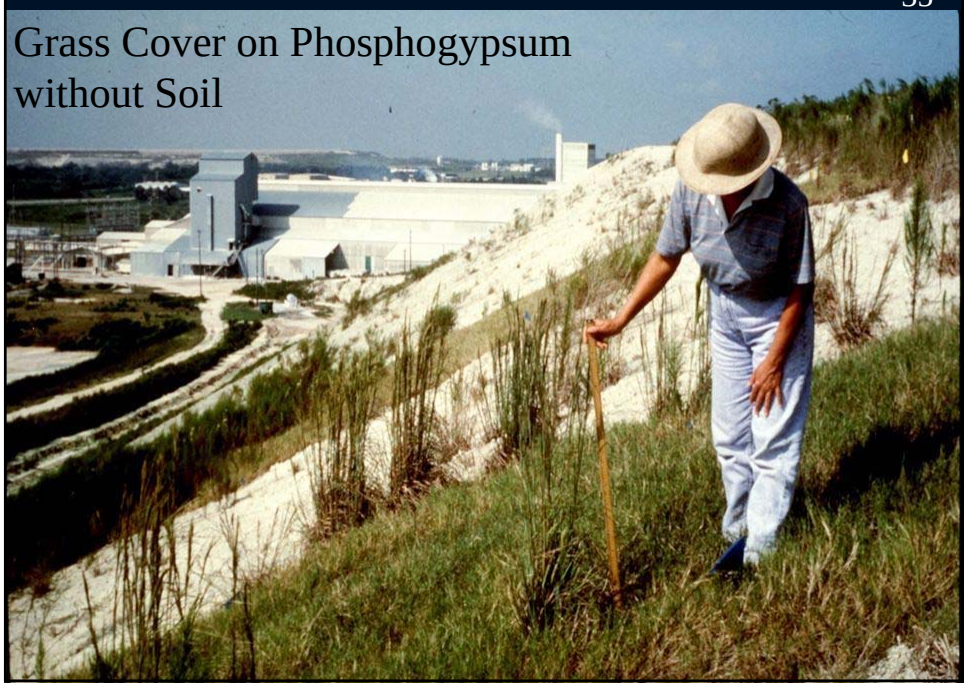
Grass Cover on Phosphogypsum without Soil



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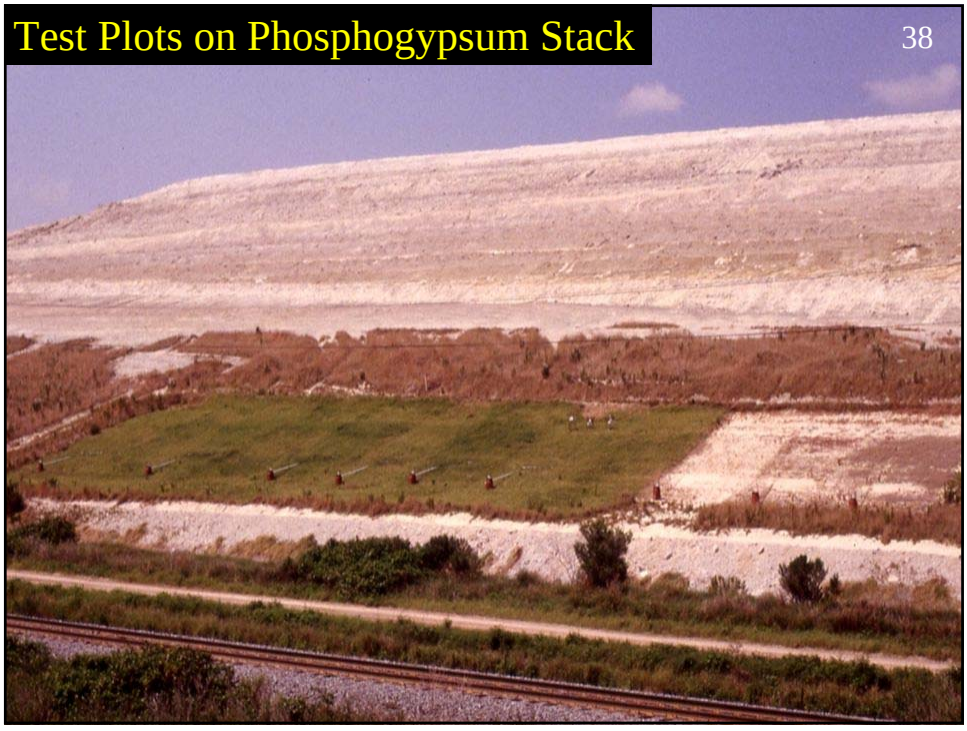
Soil Cover on Phosphogypsum Stack

Spreading Soil on Test Plots

Test Plots on Phosphogypsum Stack



Studying Runoff on Phosphogypsum Stack

How Does Phosphogypsum Storage Affect Groundwaters?

- Radium-226 levels in stack fluids are only slightly elevated (2-5 pCi/L) above background groundwater values, and are less than those found in most area monitor wells
- Stack wells are exceptionally high in activities of ^{238}U (270-450 pCi/L) and ^{210}Pb (180-1800 pCi/L)

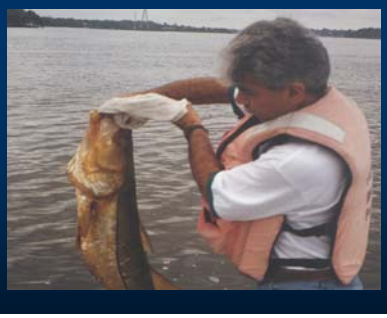
How Does Phosphogypsum Storage Affect Groundwaters?

- Most radionuclides present in groundwater under and near phosphogypsum stacks are there because of the natural geology of the region
- At most one percent of infiltrating water ever reaches the aquifer, most of the rest being intercepted by ditch drains around the stack

PHS/ATSDR-1994 Study

- No pathway for human exposure via drinking water
- Radioactivity in groundwater is at background levels
- Radioactivity in groundwater near phosphogypsum stacks is below EPA guidelines for drinking water



Dicalcium Phosphate (DCP) Recovery from Water Treatment

Traditional process DCP (left) with impurities and new process DCP (right)

Warehouse with DCP bagged for shipment

- FIPR Institute
- Facilities on SR60 in west Bartow, FL
- http://fipr.poly.usf.edu/
- (863) 534-7160

Attachment 6
The Greening of a PRP-Led Site in Central Florida

The Greening of a PRP Lead Site In Central Florida

A Presentation for

At the
University of South Florida

February 3rd, 2011

By

Mark Fleri
Senior Vice President & Chief Sustainability Officer
WRScompass

Introduction

- ***History of MGPs***
- ***Site Description and History of the Sanford MGP Site***
- ***Scope of Work***
- ***Sustainability Goals***
- ***Sustainability Results***

History of MGPs

- The history of the MGP process dates back to the late 17th and early 18th centuries
- The processing of coal, coke, or oil to produce gas for towns is referred to as manufactured gas
- The improved processes produced residuals, including tars, liquors, sludge, and other chemical compounds which we clean-up today
- Beginning in 1930, natural gas distributed via extensive pipeline and distribution systems and made available across the country

Site Description and History of the Sanford MGP site

- The **MGP** plant operated from the l880's until the 1950's
- The plant expanded until the late 1920's
- The plant consisted of:
  - *Two gas producers*
  - *One purifier*
  - *Two de-emulsifiers*
  - *200,000-cubic foot low pressure holder*
  - *42,000-cf relief gas holder*

Site Description and History of the Sanford MGP site

- 1**953:** Operations ceased
- **1963:** Propane distribution facility on site. All major structures removed except one gas holder
- **1990:** FDEP investigated the site to assess potential environmental impacts
- **2009:** Remediation begins

Scope of Work

- In-situ stabilize 90,000 cubic yards of soil and sediment
- Removal of 24,000 tons of contaminated soils
- Remove, replace and reroute utilities
- Dewater excavation
- Design and install 3,000 feet of stream bypass'
- Install 1,100 feet of culvert
- Capping
- Rehabilitate and armor 900 feet of stream bed

Sustainability Goals: EPA Green Remediation

- Minimize Total Energy Use and maximize Use of Renewable Energy
- Minimize Air Pollutants and Green House Gases
- Minimize Water Use and Impacts to Water Resources
- Reduce, Reuse, and Recycle Materials and waste
- Protect Land and Ecosystems

Green Remediation at Site

- Minimize Energy Use
  - Use of B20 diesel with ULSD
  - Use gravity diversions rather pump-a-rounds
- Minimize Air Pollutants and GHG Emissions
  - Use of Tier 2 and Tier 3 Equipment
  - Use of foam suppressants
- Minimize Water Use
  - Use of collected site water

Green Remediation at Site

- Reduce, Reuse, Recycle
  - Recycling of Trees
  - Reuse of Site Water
  - Use of recycle concrete for rip-rap
  - Send off concrete for recycling
- ***Protect land and Ecosystems***

Remediation Applications

- **Hog and haul**
- **Thermal treatment**
- ***In situ* mixing**
- **Pump and treat**
- **No action**

Former Manufactured Gas Plant
Secret Place, Florida

	Estimated Quantities	Implmentation on site	Environemental Impact	Status	Estimated Cost Impact	Acual Costs
Recycling						
Concrete*	200 tons	Feasible	Less material in Landfill	Researching	unknown	$0
Steel*	50 tons	Feasible	Less material in Landfill	Researching	cost reduction	$0
Water*	7,000,000 gallons	Feasible	Reduction in city water used and reduction of water to be treated.	Researching	cost reduction	$0
Idling Policy						
Implement	NA	Feasible	smaller CO2 foot print	Completed		$0
Tiered Equipment						
Tier II	based on availability	Feasible	smaller NMHC,SO2, Nox, and part.fp	Completed	minimal	$0
Tier III	based on availability	Feasible	smaller NMHC,SO2, Nox, and part. Fp	Completed	minimal	$0
Low Sulfur Fuel						
	127.829 gallons	Feasible	less particulate and SO2 emissions	wrapped up in B20 fuel		
Bio-diesel						
B20	127,829 gallons	Feasible	smaller CO2 foot print; less use of foreign	Completed	modest	$0
Product Substitution						
Slag vs. Cement	12,939 tons	Feasible	using waste product; smaller CO2 foot print	Completed	minimal	$0
Recycled Concrete vs Imported Rip Rap	6,000 tons	Feasible	using waste product; smaller CO2 foot print	Completed	Cost Reduction	Not approved
Office Space						
Used existing office space	N/A	Feasible	Reduction in transportation CO2 emissions	Completed	cost reduction	$0
Stream Restortion						

***preliminary data**

Major Materials CO_2 Footprint

WRScompass
Sanford MGP Site
Preliminary Data
As Bid Quantities vs In Place Quatities
CO_2 Footprint

	Final Qty (tons)	As Bid Qty (tons)	Delta Qty (tons)	Final CO_2 lbs	Final CO_2 tons	As Bid CO_2 lbs	As Bid CO_2 tons	Delta CO_2 lbs	Delta CO_2 tons
Stabilization of Soils	142,500	95,000	47,500	--	--	--	--	--	--
Aggregate, rip rap, sand, clay	64,574	44,012	20,562	6,457	3	4,401	2	2,056	1.0
Soil Disposal	62,656	44,538	18,118	6,266	3	4,454	2	1,812	0.9
Cement	5,676	12,939	(7,263)	11,352,440	5,676	25,878,000	12,939	(14,525,560)	(7,263)
Bentonite	0	810	(810)	0	0	324,000	162	(324,000)	(162)
Slag	16,111	0	16,111	676,641	338	0	0	676,641	338
Concrete Debris	8,688	11,270	(2,582)	364,889	182	1,127	1	363,762	182
Organic Debris (rootballs, tree limbs etc.)	422		422	42,240	21	0	0.0	42,240	21
Mulch	2,882		2,882	288,200	144	0	0.0	288,200	144
Tires	18	0	18	360	0	0	0.0	360	0.2
7x7 box culvert – 1.75 tons/ft – 524 feet	917	933	(16)	1,834,000	917	1,865,500	933	(31,500)	(16)
11x7 box culvert – 2.25 tons/ft – 90 feet	203	1,292	(1,089)	405,000	203	2,583,000	1,292	(2,178,000)	(1,089)
HDPE	145	145	0.0	142,076	71	14	0.0	142,062	71
10 mil Poly	2	2	0.0	2,134	1.1	0.2	0.0	2,134	1.1
12 oz Geo	2	2	0.0	2,337	1.2	0.2	0.0	2,337	1.2
8 oz Geo	2	2	0.0	1,565	0.8	0.2	0.0	1,565	0.8
Electricity	60,407	kwH		79,651	40	0	0	79,651	40
Overhead Allocation tonCO2/$MM	16			288,000	144	0	0	288,000	144
Percent Increase in Work			**50%**		**7,746**		**15,330**		**(7,584)**

Transportation CO_2 Footprint

Sanford MGP Site
Preliminary Data
As Bid Miles vs Actual Miles
CO_2 Footprint

		Final Qty (gallons)	As Bid Qty (gallons)	Delta Qty (gallons)	Final CO_2 lbs	Final CO_2 tons	As Bid CO_2 lbs	As Bid CO_2 tons	Delta CO_2 lbs	Delta CO_2 tons
Fuel	Diesel	78,750	127,849	(49,099)	1,329,300	665	2,697,614	1,349	(1,368,314)	(684)
	Gasoline*	8,505	19,629	(11,124)	164,997	82	380,803	190	(215,806)	(108)

		Qty (miles)	Qty (miles)	Qty (miles)	Final CO_2 lbs	Final CO_2 tons	As Bid CO_2 lbs	As Bid CO_2 tons		Delta CO_2 lbs	Delta CO_2 tons
Mb/Dmob Equipment		8,700	0	8,700	10,440	5	0	0.0		10,440	5
AirFare		0	33,000	(33,000)	0	0	16,500	8		36,300	18
Commute	Thad	48,500	0	48,500	58,200	29	0	0		58,200	29
Commute	Tim	13,500	0	13,500	16,200	8	0	0		16,200	8
Commute	Jim	12,125	0	12,125	14,550	7	0	0		14,550	7
Commute	Mark	16,449	0	16,449	19,739	10	0	0		19,739	10
Commute	Crew	135,000	25,000	110,000	162,000	81	30,000	15		132,000	66
	Totals	234,274	58,000	176,274		**141**		**106**	**		**35**
Trans	Aggregate Star	199,740	136,137	63,603	239,688	120	163,364	81.7		76,324	38
Trans	Pebble Junction	318	217	101	382	0.2	260	0.1		122	0.1
Trans	OMNI	255,839	40,489	215,350	307,007	154	48,587	24.3		258,420	129
Trans	Debris SpaceCoast	1,790	1,220	570	2,148	1	1,464	0.7		684	0.3
Trans	Debris Star	700	477	223	840	0.4	573	0.3		267	0.1
Trans	Debris R&J	2,430	1,656	774	2,916	1	1,987	1.0		929	0.5
Trans	Mulch SpaceCoast	670	457	213	804	0.4	548	0.3		256	0.1
*Preliminary	**Totals**					**277**		**108**			**169**

Sanford Total Estimated CO_2 Footprint

WRScompass
Sanford MGP Site
Preliminary Data*
As Bid vs In Place CO_2 Emissions
CO_2 Footprint

		Final Qty (tons)	As Bid Qty (tons)	Delta Qty (tons)	Final CO_2 lbs	Final CO_2 tons	As Bid CO_2 lbs	As Bid CO_2 tons	Delta CO_2 lbs	Delta CO_2 tons
Stabilization of Soils		142,500	95,000	47,500	--	--	--	--	--	--
Percent Increase in Work		**50%**								
Materials						**7,746**		**15,330**		**(7,584)**
Fuel	Diesel	78,750	127,849	(49,099)	1,661,625	**831**	2,697,614	**1,349**	(1,035,989)	**(518)**
	Gasoline*	8,505	19,629	(11,124)	164,997	**82**	380,803	**190**	(215,806)	**(108)**
Commute		234,274	58,000	176274		**141**		**23**		**117**
3rd Party Trucking						**277**		**108**		**169**
	Totals					**9,077**		**17,001**		**(7,924)**
***Preliminary**										

So what is the Equivalency of 8,000 tons of CO_2 Reduction

- 880 Homes
- 1,400 Cars
- 45 Coal Cars
- 5,400 Head of Cattle (Breathing Only)
- 17,000 Barrels of Oil

Equipment Input

Equipment Call-out	Engine Model/Equipment Make	Equipment Type	Engine Type	kw	hp	Equip. Hp	Equip. Hp	Equip. Model Year	Sulfur Content (ppm)	Fuel (gal/hr)	Hours	Fuel Consumption (gallons)
Chipper	Vermeer Chipper	Logging Equipment Shredders > 6 HP	Cat c16 Tier 2	469	630	<750	750	1999	500	29	206	5,974
Crane	Cat 330w/shear	Construction Equipment Cranes	CumminsNTA 855	253	340	<600	600	1997	500	15	1,925	28,875
Drill Platform	Haines Plat4m	Construction Equipment Bore/Drill Rigs	Cat c9 ATAAC	238	320	<300	300	1999	500	4	1,925	7,700
8,000# Forklift	Skytrack 8042	Construction Equipment Rough Terrain Forklifts	Cummins4BT3.9	184	247	<300	300	1999	500	4	4	16
Compactor	Skytrack?	Construction Equipment Rollers	Cat c6	114	153	<100	100	1999	500	4	666	2,664
Dump Truck	Cat D6	Construction Equipment Dumpers/Tenders	3126BT	86	115	<100	100	1999	500	5.5	1,488	8,184
Dozer	Cat 563 Compactor	Construction Equipment Crawler Dozer		86	115	<100	100	1999	500	4.5	1,649	7,421
Loader	Skid Steers	Construction Equipment Rubber Tire Loaders		56	75	<100	100	1997	500	5.5	3,168	17,424
Sweeper	Skid Steers	Industrial Equipment Sweepers/Scrubbers		56	75	<100	100	2005	500	1	1,700	1,700
Water Truck	2,000 Water Truck	Construction Equipment Off-highway Trucks		112	150	<175	175	1996	500	5.5	1,700	9,350
Pumps	Godwin Pump Misc	Light Commercial Pumps	3126BT	86	115	<175	175	1997	500	1	8,044	8,044
Pressure Washer	Misc.	Light Commercial Pressure Washers		4	5	<11	11	1998	500	1	151	151
Excavator	Cat 330	Construction Equipment Excavators	Cat c9 ATAAC	184	247	<300	300	2008	500	8.75	2,958	25,883
EXC. w/shear	Cat 330w/shear	Construction Equipment Excavators	Cat c9 ATAAC	184	247	<300	300	2007	500	8.75	240	2,100
EXC. w/grapple	Cat 330w/grapple	Construction Equipment Excavators	Cat c9 ATAAC	184	247	<300	300	2006	500	8.75	250	2,188
EXC. w/grapple	Cat 330w/grapple	Construction Equipment Excavators	Cat c9 ATAAC	184	247	<300	300	2005	500	8.75	80	700
Total											26,154	128,373

Equipment Emissions Output T1 (g/hp-hr)

Engine Model/Equipment Make	Equip. Hp	Equip. Model Year	HC g/hp-hr	\MHC+Nox g/hp-hr	CO g/hp-hr	Nox g/hp-hr	PM10 g/hp-hr	SPM adj g/hp-hr	PM10(ADJ) g/hp-hr	C02 g/hp-hr	S02 g/hp-hr	Tier
Vermeer Chipper	630	1999	0.1553	5.6980	2.0534	5.5452	0.2848	0.0733	0.2115	530.5478	0.1626	T1
Cat 330w/shear	340	1999	0.2083	6.3344	1.4103	6.1294	0.2759	0.0733	0.2026	530.3788	0.1625	T1
Haines Plat4m	320	1999	0.3137	5.9491	0.7832	5.6404	0.3084	0.0733	0.2351	530.0423	0.1624	T1
Skytrack 8042	247	1999	0.3347	5.7447	1.2500	5.4154	0.4451	0.0733	0.3718	529.9756	0.1624	T1
Skytrack?	153	1999	0.5682	6.0129	4.0055	5.4538	0.8726	0.0815	0.7911	588.5569	0.1803	T1
Cat D6	115	1999	1.2058	7.3866	6.2514	6.2001	1.0553	0.0815	0.9738	586.5229	0.1797	T1
Cat 563 Compactor	115	1999	0.5730	6.0489	4.0950	5.4850	0.9400	0.0815	0.8585	588.5416	0.1803	T1
Skid Steers	75	1999	0.5720	6.0414	4.0764	5.4785	0.9260	0.0815	0.8445	588.5448	0.1803	T1
Skid Steers	75	1999	0.1864	3.1969	2.5663	3.0135	0.3798	0.0815	0.2982	589.7749	0.1807	T1
2,000 Water Truck	150	1999	0.3925	6.1302	1.7150	5.7440	0.8172	0.0733	0.7439	529.7911	0.1623	T1
Godwin Pump Misc	115	1999	0.3443	6.0566	0.9090	5.7178	0.3438	0.0733	0.2705	529.9449	0.1624	T1
Misc.	5	1999	0.7710	6.0260	4.2370	5.2674	0.5107	0.0815	0.4292	587.9099	0.1801	T1
Cat 330	247	1999	0.1942	2.7969	1.1914	2.6057	0.2493	0.0733	0.1760	530.4236	0.1625	T1
Cat 330w/shear	247	1999	0.1949	2.8004	1.2152	2.6086	0.2637	0.0733	0.1904	530.4213	0.1625	T1
Cat 330w/grapple	247	1999	0.1957	2.8040	1.2390	2.6115	0.2781	0.0733	0.2048	530.4190	0.1625	T1
Cat 330w/grapple	247	1999	0.1964	2.8076	1.2629	2.6144	0.2925	0.0733	0.2192	530.4167	0.1625	T1

cleanNgreen Measurements

- **Project-level Carbon Footprint Calculation**
- **Methodology and emission factors developed from publicly available sources**

Lessons Learned

- Do not underestimate the time involved
- Easiest way to mine data is through the accounting software. Make sure you have the appropriate cost codes.
- Some items to be tracked:
  - Fuel
  - Equipment (owned and rental)
  - Materials
  - Transportation
- Always know that you can revise the numbers with better data
- Green remediation is not “no remediation”

Lessons Learned

- Develop a library of emissions factors
- Try to set up data bases with usage parameters that align with published emissions factors
- Don’t expect others to be as enthusiastic as you in counting greenhouse gases
- Multi-disciplinary nature of work
- Expect and deal with frustration
- Don’t get overwhelmed by the numbers

Questions?

Attachment 7
Activities in Response to the Deepwater Horizon Oil Spill

USGS
science for a changing world

St. Petersburg Coastal and Marine Science Center

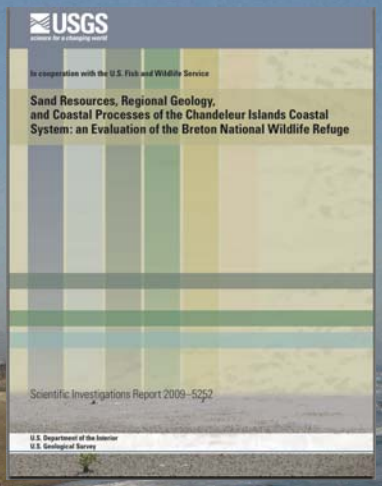
Activities in Response to Deepwater Horizon Oil Spill

February 3, 2011

Jack Kindinger
Science Center Director

U.S. Department of the Interior
U.S. Geological Survey

Comprehensive research to support management decisions



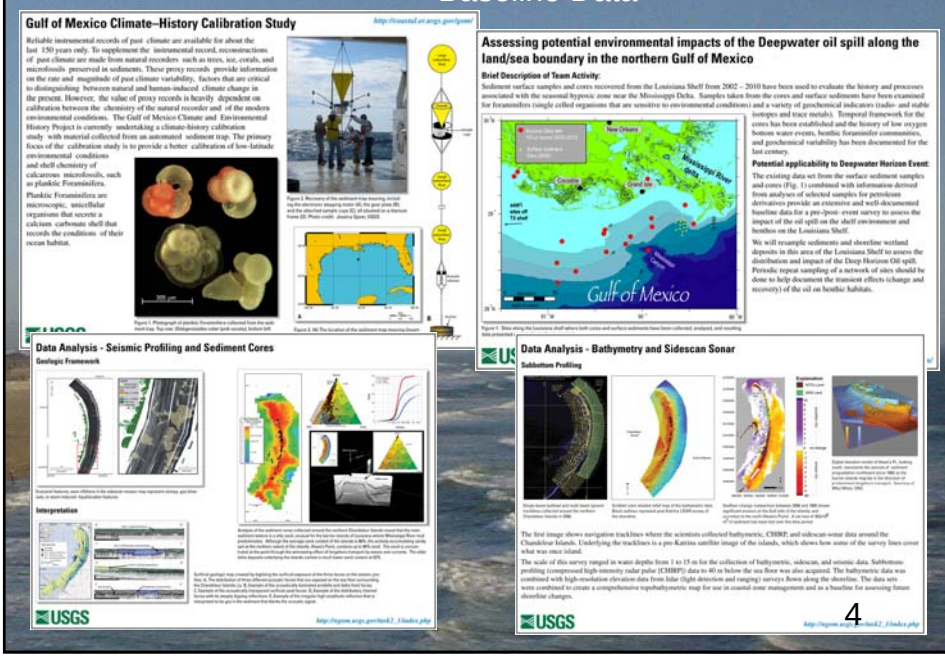
- Shoreline Change
- Barrier Island Recovery Potential
- Effects of Sea Level Rise
- Seafloor Evolution and Sediment Dynamics
- Geologic Mapping of Potential Sediment Resources
- Wave and Sediment Transport Modeling
- Management Planning

THE UNIVERSITY of NEW ORLEANS

DWH Oil Spill Response Critical Elements

- Baseline Data
- Pre-spill Samplings
- Predictive Modeling
- Case Study: Coastal Protection Berms
- Scientific Expertise and Advice

Baseline Data



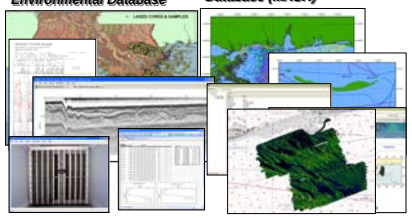
St. Petersburg Coastal and Marine Science Center:

Baseline Data

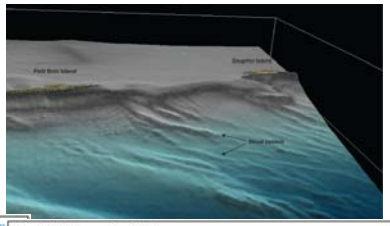
Geologic Databases

Louisiana Sedimentary and Environmental Database

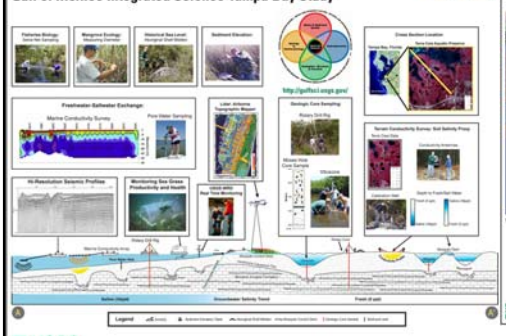
Mississippi-Alabama Shelf Sedimentary and Environmental Database (MASH)



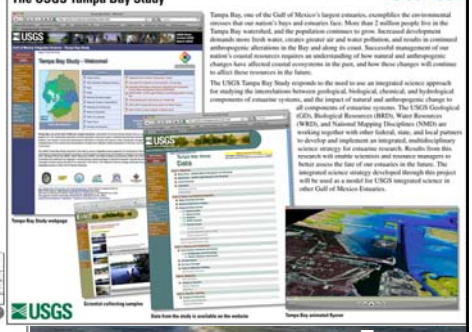
High-resolution Bathymetry Dauphin Island, AL



Gulf of Mexico Integrated Science Tampa Bay Study



The USGS Tampa Bay Study



USGS

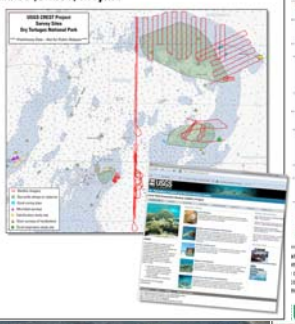
St. Petersburg Coastal and Marine Science Center:

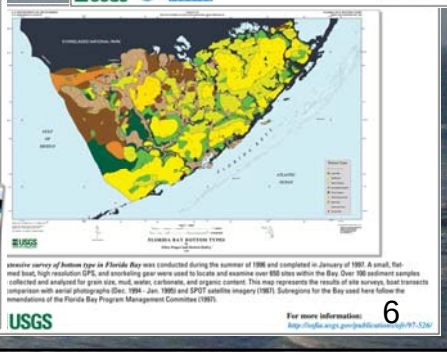
Baseline Data

Quantifying the Impact of the Deepwater Horizon Oil Spill on Benthic Habitats

Florida Shelf Ecosystems: Habitat baselines for use in GOM Deepwater Horizon Oil Spill

USGS Coral Reef Ecosystem Studies (CREST) Project





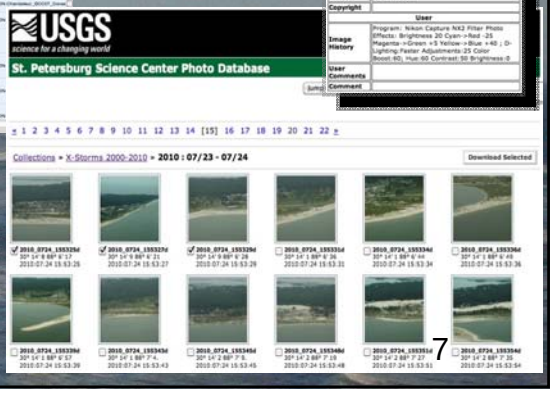
USGS

St. Petersburg Coastal and Marine Science Center:

Baseline Data

Deepwater Horizon –
SUDS geodatabase + WMS web mapping service

Photo Database

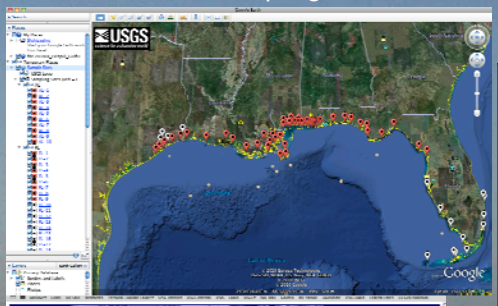


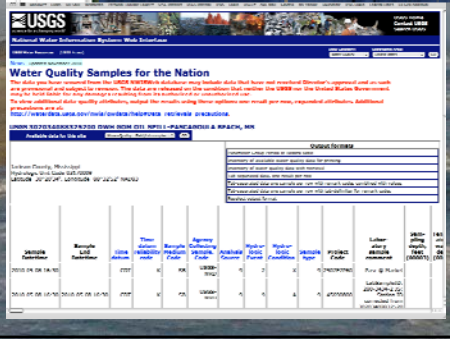
USGS

St. Petersburg Coastal and Marine Science Center:

Pre-spill Sampling

Beach shoreface sampling





Oblique Photography

St. Petersburg Coastal and Marine Science Center:

Predictive Modeling

Prediction of Barrier-Island Inundation and Overwash: Application to the Gulf of Mexico Deepwater Horizon Oil Spill

The risk of oil deposition on barrier islands and marshes can be identified by comparing island elevations to models of storm surge and wave runup. The combination of wind-driven surge, astronomical tide, and swash due to breaking waves elevates water levels along the beaches, allowing waves and currents to transport floating oil further landward than would be likely during low tides and calm conditions. The potential exists for water to move across the full width of the islands in locations that are both low and narrow, possibly transporting oil inland into the back bays and marshes.

Ongoing tasks include forecasts of inundation and overwash for a number of weather conditions, including moderate winds, tropical storms, and hurricanes.

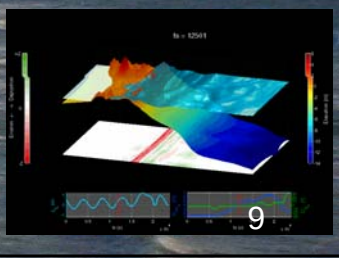
For more information:
http://coastal.er.usgs.gov/hurricanes/deepwaterhorizon/

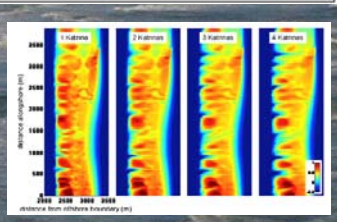
USGS

Analysis regions

Hydrodynamic and morphologic modeling

Overwash simulations using XBEACH





Simulated island evolution after repeated storm impacts

St. Petersburg Coastal and Marine Science Center:

Case Study: Coastal Protection Berms

E-3 and E-4 Berm construction plans

Emergency permit issued May 27 to Louisiana from USACE, N.O. District to build 21 miles of sand berms

Chandeleur Islands
- **To trap oil on sand (instead of marsh) and reduce number of inlets requiring booms**

Sand berm to be:
- **~ 300' at the base,**
- **~ 25-foot at the crown**
- **~ 6'above the MHWL**

Gaps for tidal exchange

Targeted Borrow sites: Hewes Point and St. Bernard Shoals

USGS

St. Petersburg Coastal and Marine Science Center:

Case Study: Coastal Protection Berms

Released June 2, 2010

Effects of Building a Sand Barrier Berm to Mitigate the Effects of the Deepwater Horizon Oil Spill on Louisiana Marshes

By Dawn Lavoie,[1] James G. Flocks,[1] Jack L. Kindinger,[1] A.H. Sallenger, Jr.,[1] and David C. Twichell[2]

Background

The State of Louisiana requested emergency authorization on May 11, 2010, to perform spill mitigation work on the Chandeleur Islands and on all the barrier islands from Grand Terre Island eastward to Sandy Point to enhance the capability of the islands to reduce the movement of oil from the Deepwater Horizon oil spill to the marshes. The proposed action—building a barrier berm (essentially an artificial island fronting the existing barriers and inlets) seaward of the existing barrier islands and inlets—"restores" the protective function of the islands but does not alter the islands themselves. Building a barrier berm to protect the inundated wetlands from oil is a new strategy and depends on the timeliness of construction to be successful. Prioritizing areas to be breached, focusing on those areas that are most vulnerable and where construction can be completed most rapidly, may increase chances for success. For example, it may be easier and more efficient to breach the narrow inlets of the coastal section to the west of the Mississippi River Delta rather than the large expanses of open water to the east of the delta in the southern parts of the Breton National Wildlife Refuge (NWR). This document provides information about the potential available sand resources and effects of berm construction on the existing barrier islands.

The proposed project originally involved removing sediment from a linear source approximately 1 mile (1.6 km) gulfward of the barrier islands and placing it just seaward of the islands as shallow water (~2-m depth where possible) to form a continuous berm rising approximately 6 feet (~2 m) above sea level (North American Vertical Datum of 1988—NAVD88) with an ~135-yd (~100-m) width at water level and a slope of 25:1 to the seafloor. Discussion within

[1] U.S. Geological Survey, Office of the Screven Region Executive, Gulf Coast Focus Area Coordinator, Stennis Space Center, Mississippi.
[2] U.S. Geological Survey, St. Petersburg Coastal and Marine Science Center, St. Petersburg, Florida.

the U.S. Geological Survey (USGS) and with others led to the determination that point-source locations, such as Heaves Point, the St. Bernard Shoals, and Ship Shoal, were more suitable "borrow" locations because sand content is much greater along a linear track offshore from most of Louisiana's barrier islands (fig. 1). Further, mining sediment near the toe of the barrier island platform or edge of actively eroding barrier islands could create pits in the seafloor that will capture nearshore sand, thereby enhancing island erosion, and focus incoming waves (for example, through refraction processes) that could yield hotspots of erosion. In the Breton NWR, the proposed berm would be continuous from just south of Heaves Point to Breton Island for approximately 100 km with the exception of several passages for vessel access. Proposed volume estimates by sources outside of the USGS suggest that the structure in the Breton NWR would contain approximately 70 million cubic yards (42.8 m³) of sandy material. In the west, the berm would require approximately 30 million cubic yards (27.3 m³) of sandy material because this area has less open water than the area to the east of the delta. The planned berm is intended to protect the islands and inland areas from oil and would be sacrificial, that is, it will rapidly erode through natural processes. It is not part of the coastal restoration plan long discussed in Louisiana to rebuild barrier islands for hurricane protection of inundated infrastructure and habitat.

Potential Sand Resources

Sand resources along coastal Louisiana both east and west of the active delta are exceedingly scarce. Most suitable borrow material is from point sources within modern nearshore deposits or buried fluvial (river) deposits associated with earlier stages of delta formation (fig. 2-4, 2). The following paragraphs highlight the sand sources that may be most suitable for berm construction.

East of the Mississippi River Delta in the Breton Sound segment of the berm project (fig. 2-5), the permit application recommends that sediment be mined from Heaves Point for

Recommendations and Considerations

- Construction in timely manner
- Prioritize construction
- Low-intensity storms could allow transport of oil passed berm
- Reduction of inlet carrying capacity during berm construction
- Sufficient oversight and information
- Should not be confused as a true barrier-island restoration
- Emergency conditions allow no time for adequate environmental assessment
- Long-term Monitoring is recommended

USGS

St. Petersburg Coastal and Marine Science Center:

Case Study: Coastal Protection Berms

Tropical Depression #2, July 2010

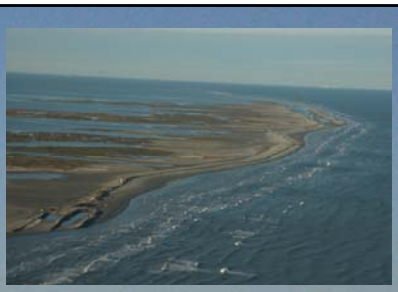
Construction started 15 June

As of August 5, ~4 miles of berm had been constructed at cost of $120 million provided by BP (Source: Times-Picayune)

USGS

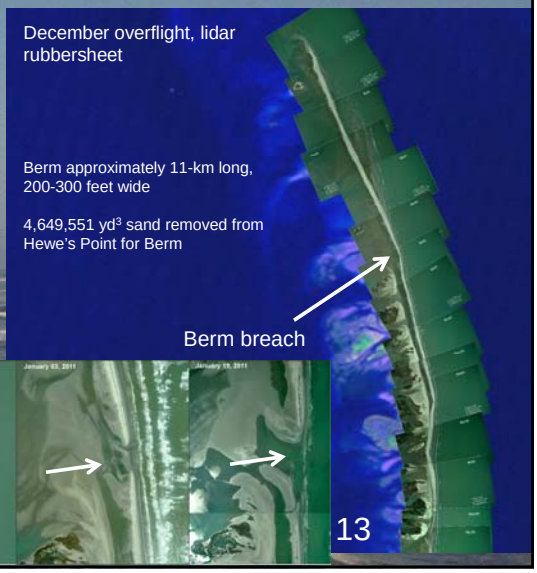
St. Petersburg Coastal and Marine Science Center:

Case Study: Coastal Protection Berms – Restoration Project



Berm Construction Monitoring

- Pre-construction Topo/Bathy
- Areal Photography
- Satellite Images
- November 2010 Topo/Bathy
- February 2011 Topo/Bathy



USGS

St. Petersburg Coastal and Marine Science Center:

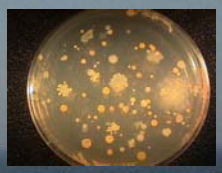
Post Spill Analyses: Microbial Ecology Studies - Shallow and Deep Water Corals; Sandy Shoreface of Northern Gulf Beaches

Potential Impacts on Deep-Sea Coral Reef Ecosystems

Oil impacts on remote deep ecosystems (depths of 370 meters and below) are not known.

http://fl.biology.usgs.gov/DISCOVRE/

Role of Bacteria in Bioremediation



Characterizing microbes found in beach sediments from both oil-impacted and non-impacted areas to determine whether there have been significant changes in microbial communities.

USGS

St. Petersburg Coastal and Marine Science Center:

Deepwater Horizon Response: OSAT

- In response to the Deepwater Horizon MC252 Oil Spill of National Significance, the Operational Science Advisory Team (OSAT) was formed by the Unified Area Command (UAC) headquartered in New Orleans, LA.

- OSAT was formed in mid-August as an interagency team. Representatives from BP, USCG, NOAA, EPA, BOEMRE, and USGS were included on OSAT.

Responsibilities:

1)Assess near real-time data collected by the response

2)Identify sampling gaps in the sampling strategy

3)Make recommendations, as part of an adaptive sampling strategy

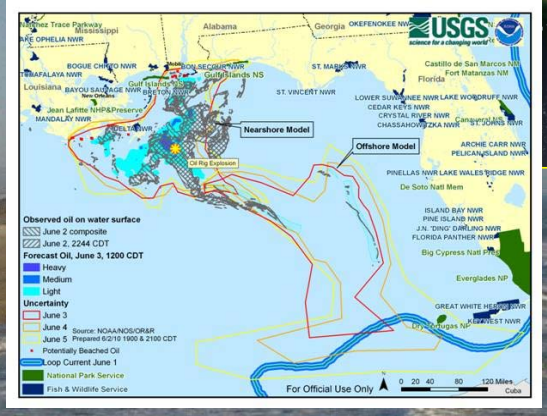
4)Analyze data collected during the response to provide an assessment regarding the presence of oil and/or dispersant-related chemicals.

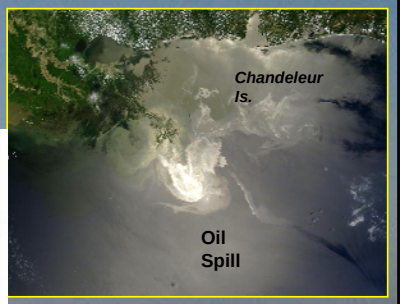
The USGS supplied representatives with scientific expertise in sediment sampling and general knowledge of data assessment and analysis.

USGS

St. Petersburg Coastal and Marine Science Center:

Deepwater Horizon Oil Spill





USGS

Attachment 8
Summary of the Florida Fish and Wildlife Conservation Commission's Role in the Deepwater Horizon Oil Spill Response

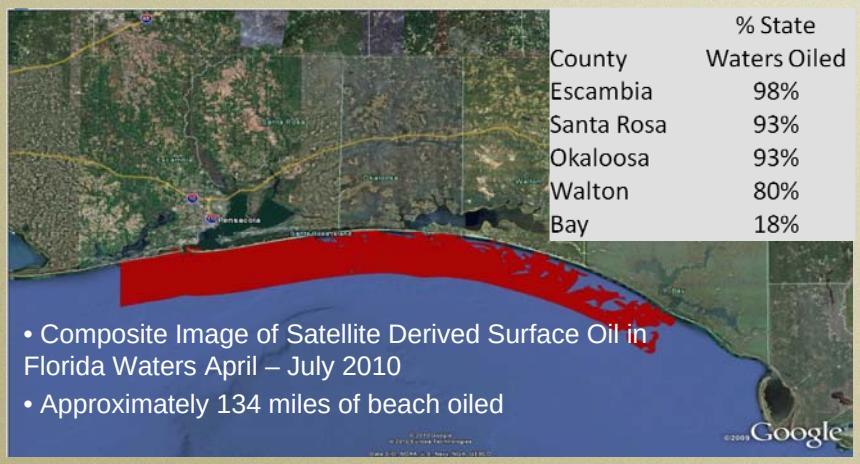
Summary of FWC's Role in the DWH Oil Spill Response

Amber Whittle, Habitat Research
February 2011

Oil and Dispersant: by the numbers

- 4.4 – 5.4 million barrels spilled
- Oil-water mix recovered: over 34.7 million gallons.
- Dispersant: more than 1.84 million gallons deployed (58% surface; 42% at depth)
- 3 June 2010, first impact to FL beaches
- 2.3 million lbs of oiled material removed from FL beaches

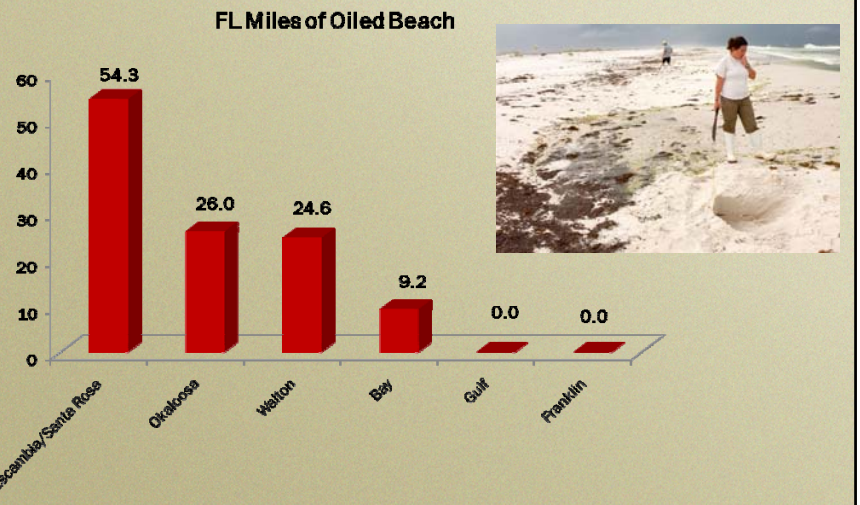
Deepwater Horizon Oil in Florida Waters



County	% State Waters Oiled
Escambia	98%
Santa Rosa	93%
Okaloosa	93%
Walton	80%
Bay	18%

- Composite Image of Satellite Derived Surface Oil in Florida Waters April – July 2010
- Approximately 134 miles of beach oiled

Shoreline Impacts



The Role of FWC

- Law Enforcement support/reconnaissance
- Area Contingency Plan Implementation
- Serve as state Scientific Support Coordinators
- Command Center/EOC support
- Response plans for oiled, injured, dead wildlife
- Natural Resource Damage Assessment (NRDA)
- Pre-impact sampling and assessment
- 115,000 staff hours

Law Enforcement Support/Reconnaissance

- Conduct initial ground/air reconnaissance movements associated with oil approach and landfall.

- Communicate conditions and situations by means appropriate to the disaster.

Purpose of RECON

- Actionable Intelligence allows emergency management officials to make informed, timely decisions regarding follow-on response to better assist impacted areas with response, mitigation, and recovery.
- Provide Information
  - State Government officials (DEM, DEP, FWRI)
  - Federal Government officials (FEMA, FLNG, USCG)
  - Counties
  - Municipalities

FWC Assets

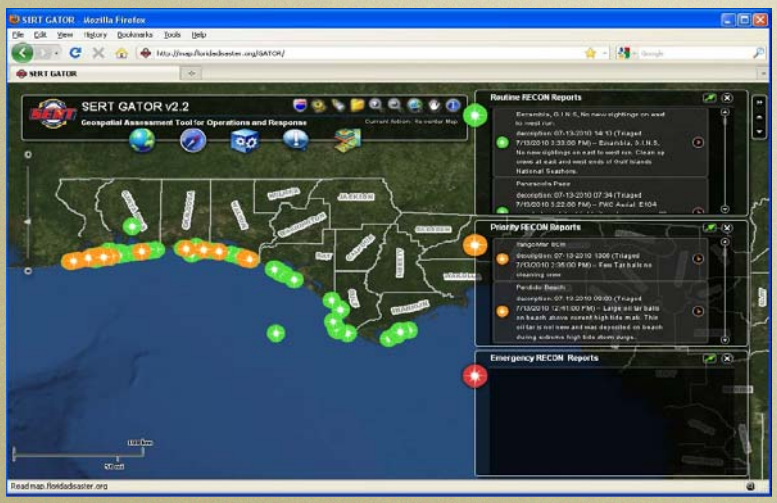
- 3 Helicopters
- 1 Fixed Wing
- 54 Mid-Range Vessels
- 2 Off-Shore Vessels
- 7 ATVs
- 249 Personnel

RECON Reports

- Reporting
  - Users can enter pertinent information online including:
    - Date/Time
    - Photos
    - Coordinates
    - Narrative
- Triage
  - Teams at the EOC receive and triage the reports.
  - After triage, a final report is created and sent to Geospatial Assessment Tool for Operations and Response (GATOR)
  - Report is analyzed by Science Branch
  - Referred to Spill Cleanup Assessment Team (SCAT)

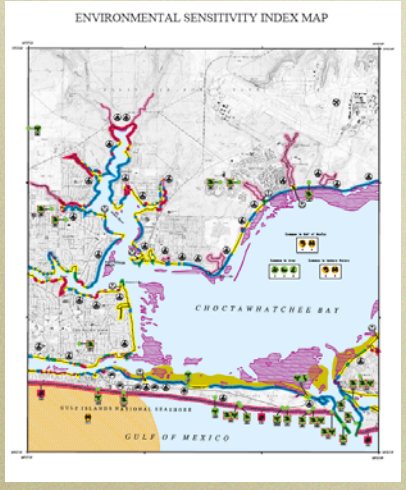
Final RECON Report

GATOR – Public Website



Area Contingency Plans

- Detailed habitat maps produced by FWC guided placement of booms
- Updated information for several areas based on county input
- Habitat maps also used to prevent damage to resources from response activities



State Scientific Support

- FWC scientists part of command center team
- Guided key decisions on booming, shoreline protection, clean-up, response etc.
- Presence at ICP in Mobile and now GCIMT in NOLA
- FWC lead on sea turtle and manatee response



Wildlife Response Plans

- Scale of the event created unprecedented challenges
- BP contracted for rehabilitation services
- Gap identified in rescue capability
- FWC worked with unified command, BP and wildlife re-habbers to create comprehensive response plans

Background

- The area of the oil spill includes 8,332 wildlife species:
  - >1,200 fish
  - >200 birds
  - 1,400 mollusks,
  - 1,500 crustaceans
  - 4 sea turtles
  - 29 marine mammals

Visibly Oiled Birds

- Total recovered dead and alive – 492
- Total recovered dead – 238
- Total recovered alive – 254
  - 42 released

Most Commonly Recovered Birds (Alive)

- Northern gannet > 100
- Common loon
- Pied-billed grebe
- Laughing gull
- Great blue heron
- Brown pelican

25 different species recovered

Visibly Oiled Sea Turtles

- Total recovered dead – 4
- Total recovered alive – 445
  - 325 released alive

Sea Turtle Nests Moved

259 nests relocated; 13,688 hatchlings released

19

Oiled Dolphins

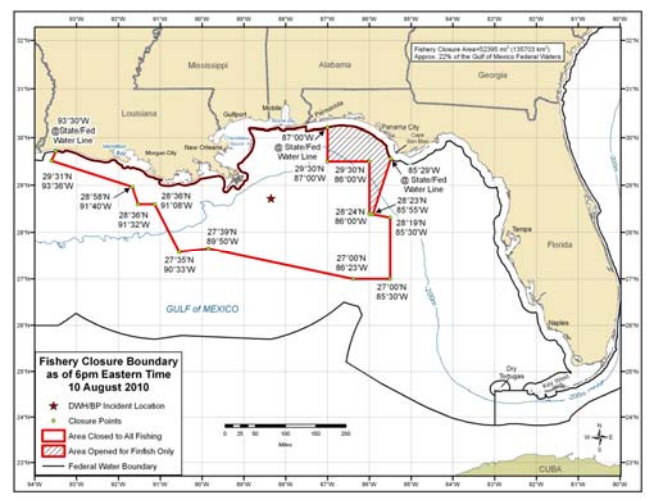
- 1 visibly oiled dolphin rescued

20

Status – Marine Fisheries

- State waters are open to fishing and shrimp harvest.
- Most federal waters off Florida coast are open again
- No direct, immediate oil impacts on fish populations
- Mistaken perception of tainted fish and waters have had most impact in Florida
- Working with Gulf States and NOAA Fisheries for long-term marketing -- $15 million federal disaster relief
- Communication was key
  - 35 conference calls with stakeholders since May 3rd

NOAA Fisheries Closures



Natural Resource Damage Assessment

- Trustee representatives for FL
  - Lee Edmiston, Larry Morgan – FL DEP
  - Gil McRae – FL FWC
- 18 July 2010 no more oil released
- 19 September 2010 well “killed”

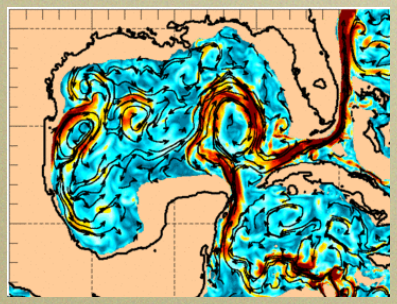
NRDA Technical Working Groups

- Staff are actively involved in many TWGs
- Aerial Imagery, Shorebird, Marsh Bird, Diamondback Terrapin, Waterfowl, Chemistry, Data Management/GIS, Shoreline, SAV, Marine Mammal, Human Use, Mammals & Turtles, Crocodile, Fish, Corals, etc.

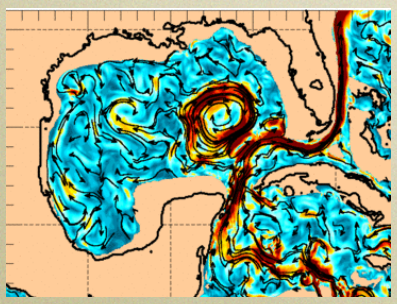
Pre-impact NRDA Sampling

- FWC scientists actively involved in sampling for pre-impact conditions
- Offshore fisheries cruises
- Marsh and shorebird surveys
- Marine Mammal aerial surveys
- Seagrass and Coral sampling

Oil Movement and the Loop Current



May 2, 2010



June 7, 2010

Source: Naval Oceanographic Office

Subsurface Oil

- Early reports refuted presence
- Dissolved subsurface oil now confirmed by USF, Woods Hole, NOAA and others
- Concentrations appear to be low; but degrading slower than previously thought
- FWC monitoring inshore and on artificial reefs (USS Oriskany) failed to find visible oiling at depth
- Long term impacts unknown

Ongoing and Future FWC efforts

- Response capability in place if re-oiling occurs
- Monitoring and research on subsurface oil and its impacts will be a focus area
- Research to document extent of injury on wildlife and habitats just beginning
- NRDA Case development

Documenting Injury in Florida

- FL has had less direct injury to natural resources from oil than other states
- NRDA focus near term:
  - Human Use: beach tourism, fishing, boating
  - Damage due to response activities: dune, seagrass damage
  - Potential fouling of sands to be used in beach re-nourishment activities
- NRDA long-term focus will be on fisheries

NRDA Human Use Impacts

- Aerial surveys of beach use
- Counts and field surveys at boat ramps, piers, docks, shorelines.

- Models to estimate human use loss for beaches, recreational fishing and boating
- Sampling to continue into at least next year

Injury Assessment

- Injury assessments beginning
  - Birds
  - Seagrasses
  - Corals (Feb 2011)
  - Sea Turtle Nesting
  - Fisheries
  - Toxicity Testing

- Monitoring is being conducted as part of cooperative workgroups with consistent methodology across regions.

Attachment 9
Looking Over the (Deepwater) Horizon

Looking over the (Deepwater) Horizon

Captain Gary D. Petrae, NOAA (Ret.)
Emergency Response Division
Office of Response and Restoration
National Oceanic and Atmospheric Administration | NOAA

January 2011

Focus of today

Role of NOAA – mandates and key areas of support

What were some of the challenges and public concerns

What role did technology play

What can we expect as we look "over the horizon"

5 Key Areas for NOAA

Providing **science support** to decision makers

Keeping **seafood** safe

Protecting **wildlife** & **habitats**

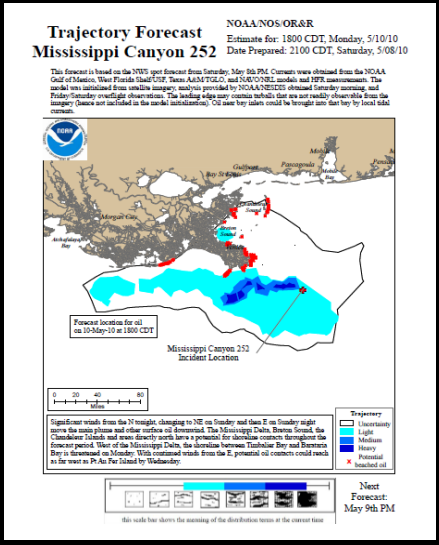
Assessing natural resource **damage**

Restoring the natural resources that were injured

5 Key Areas for NOAA

Providing **science support** to decision makers

Trajectory forecasts



5 Key Areas for NOAA

Providing **science support** to decision makers

Weather, earth and oceanographic Data

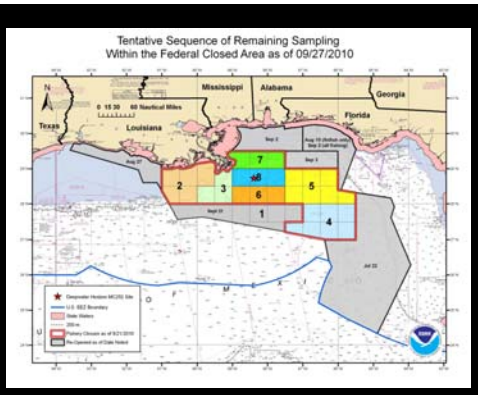
5 Key Areas for NOAA

Providing **science support** to decision makers

Response Strategies

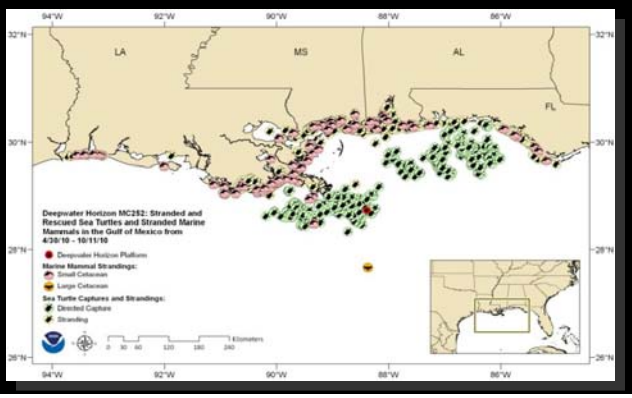
5 Key Areas for NOAA

Keeping **seafood** safe



5 Key Areas for NOAA

Protecting **wildlife** & **habitats**



5 Key Areas for NOAA

Assessing natural resource **damage**

5 Key Areas for NOAA

Restoring the natural resources that were injured

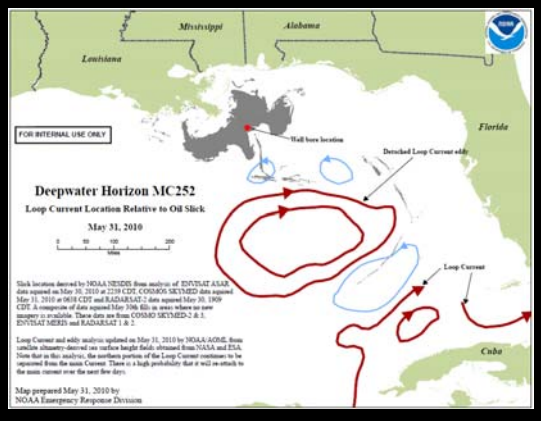
Challenges and Public Concern

Subsurface

- Flow Rate
- Use Subsurface dispersants
- Fate and Effect of oil rising up from the bottom
- Potential biological impacts of subsurface oil

Challenges and Public Concern

Surface



- Fate and Effect of oil on surface
- Movement of oil by wind and current
- LOOP Current

Challenges and Public Concern

Surface

Hurricanes

Ecosystem impact of oil as well as removal

- Mechanical
- In Situ burns
- Surface Dispersants

Challenges and Public Concern

Shoreline

- Protection strategies
- SCAT Teams
- Different types of Shoreline Clean Up
- Damage Assessment

General Public Concerns

eat

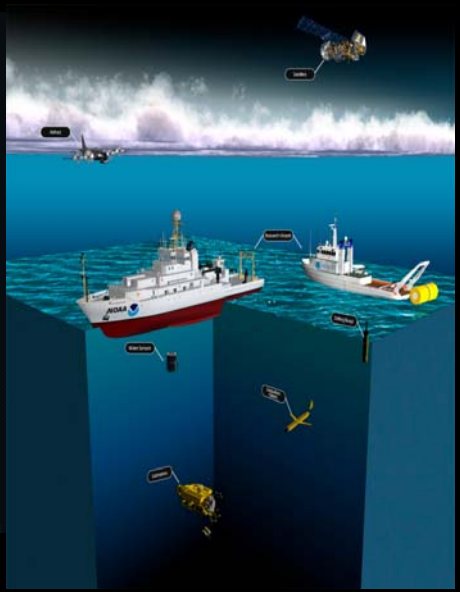
fish

swim

Issues Looking Forward

for E&P

- **Planning and Preparedness for E&P**
- **Containment and underwater Countermeasures**
- **Fate – Effect better science and modeling**
- Fate – Effect



Issues Looking Forward

- Seafood safety
- Fisheries closures/Wildlife impacts
- Research and Development
- New Technology

Attachment 10
In Situ Characterization of Subsurface Chemical Distributions Using Underwater Mass Spectrometry

In Situ Characterization of Subsurface Chemical Distributions using Underwater Mass Spectrometry

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Marine Technology Program
St. Petersburg, Florida

Sustainable Remediation Forum
SURF 16
February 3, 2011

Need for In-water Chemical Monitoring and Profiling

- Oceans and coastal regions
  - Biogeochemical studies
  - Hydrothermal vent analysis
  - Pollution monitoring and tracking
  - Bloom and plume diagnostics
  - Energy source discovery
    - Methane and natural gas
    - Oil reservoirs
- Harbors and internal waterways
  - Port safety and security
    - Inadvertent chemical release
    - Deliberate chemical release
  - Water supply monitoring
  - Ecosystem health (global climate change)

National Aeronautics and Space Administration
Lewis Research Center

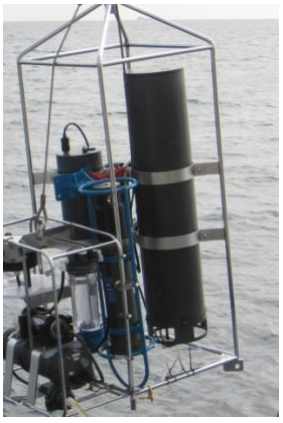
Approach of In Situ Analysis Provides Benefits

- Reduced sample contamination
- Increased sampling speed/density
- Real-time feedback
  - Rapid response
  - Adaptive sampling
  - Gradient mapping
- Self-directed sensors

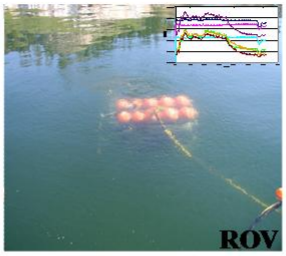
Mass spectrometry allows sensitive simultaneous detection of multiple chemical species with high specificity

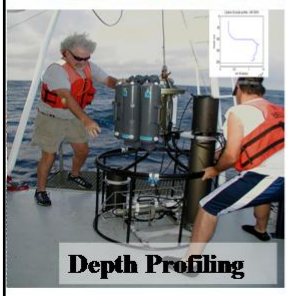
Portable Underwater Mass Spectrometry (UMS)

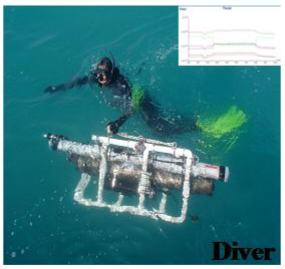
- Membrane introduction mass spectrometry (MIMS)
- Simultaneous in situ detection of multiple analytes
  - Dissolved gases
  - Volatile organic compounds (VOCs)
  - Light hydrocarbons
- Recent deployments
  - Santa Barbara (SB) Channel: two-dimensional mapping
  - Gulf of Mexico: gas hydrates research
  - Gulf of Mexico: site MC118
  - Gulf of Mexico: deep tow surveys

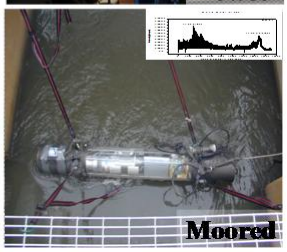


Deployment Methods

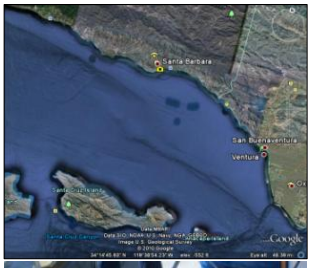


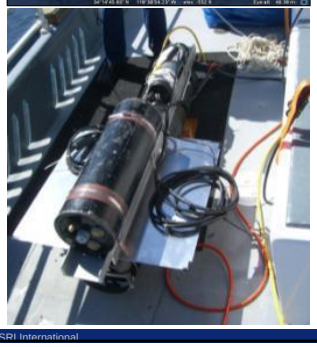






In Situ Methane Measurements in the Santa Barbara Channel Using UMS Analyses (Sept. 2009)

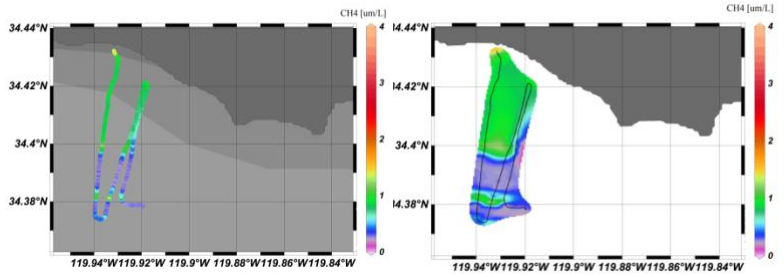




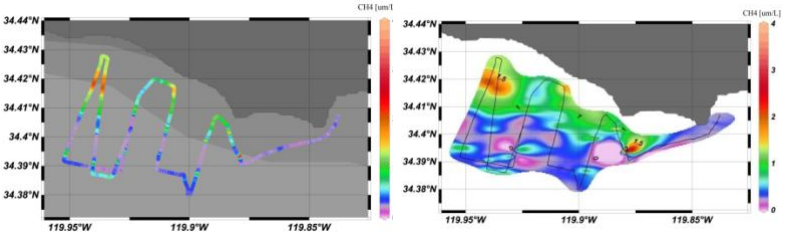
- Surface tow surveys of dissolved gases and VOCs with UMS in SB Channel
- UMS mounted on custom towfish along with conductivity, temperature, and depth (CTD) sensor and battery vessel
- Communicated with instrument through a tethered Ethernet connection

Transects and Interpolated UMS Data in SB Channel

Day 1, Sept. 28, 2009



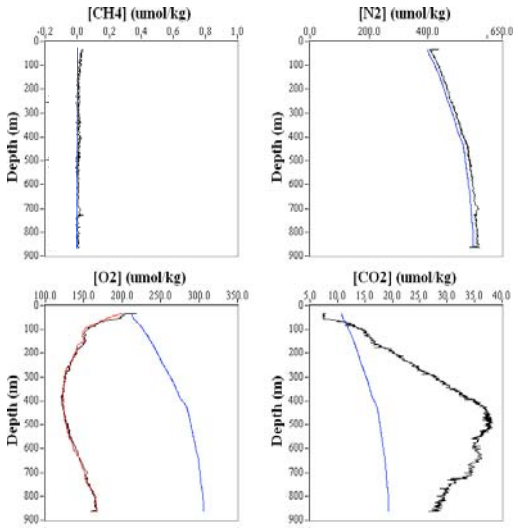
Day 3, Sept. 30, 2009



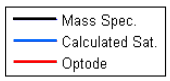
UMS for Hydrates Research in the Gulf of Mexico (March 2009)

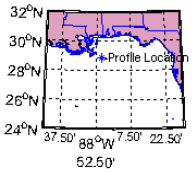
- Vertical profiles of dissolved gases with UMS in Gulf of Mexico (MC118)
- UMS mounted on custom frame along with CTD, dissolved oxygen (DO), and pH sensors
- Communicated with instrument through standard UNOLS CTD tether using Seabird modem
- Determined dissolved gas concentrations from UMS data with the aid of a portable calibration unit

Depth Profile Data – Gulf of Mexico



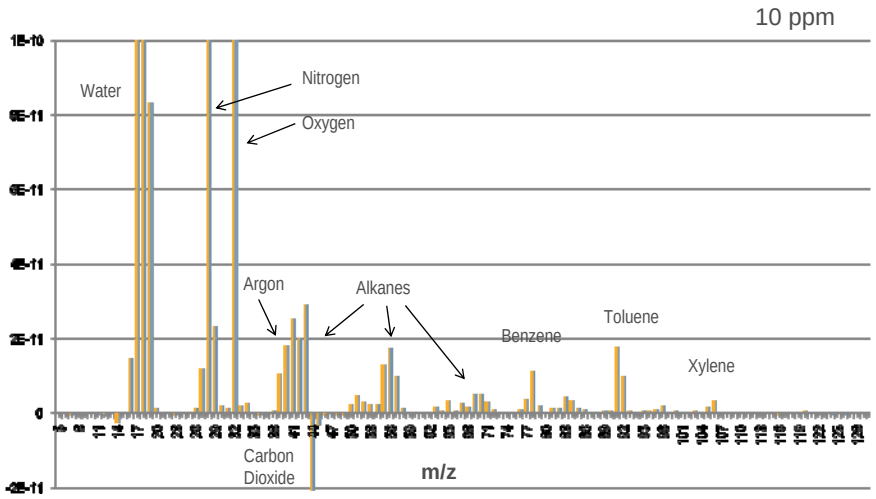
Argon Corrected





Deepwater Horizon Incident – Subsurface Oil

Louisiana Crude Reference Oil Dissolved in Water

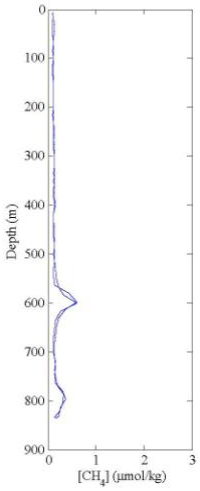


Background Subtracted Mass Spectrum

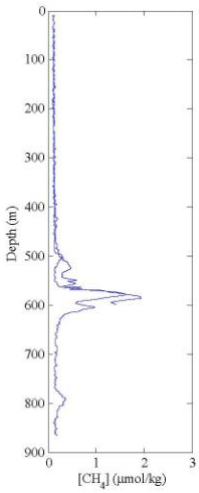
UMS Deployment at MC118 (June 2010)

- Vertical profiles of dissolved gases with UMS in Gulf of Mexico (MC118)
- UMS mounted on custom frame along with CTD, DO, and pH sensors
- Communicated with instrument through standard UNOLS CTD tether using Seabird modem

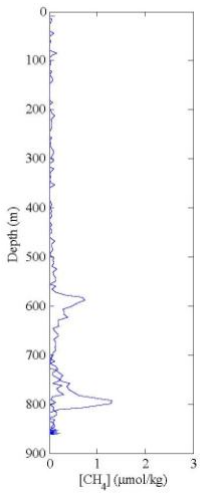
Vertical Methane Concentration Profiles at MC118



Cast 1

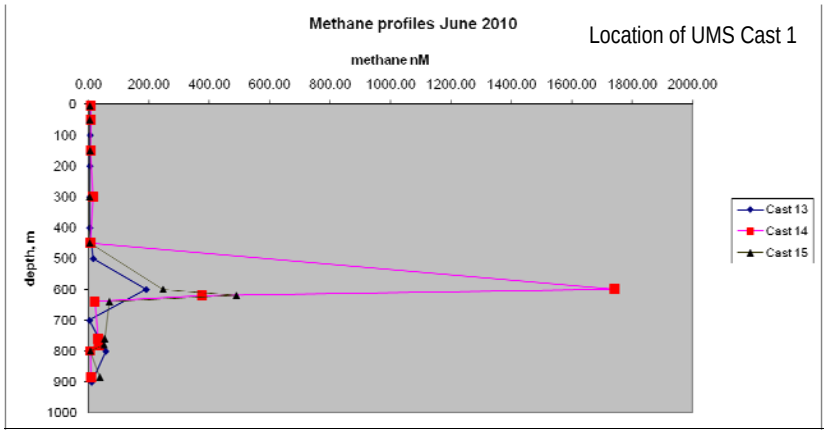


Cast 2



Cast 3

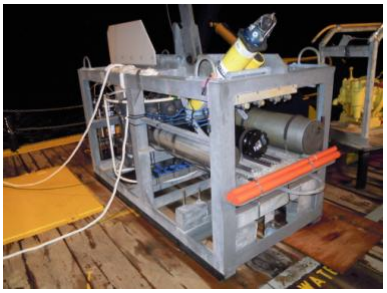
Analysis of Collected Samples at MC118



Location of UMS Cast 1

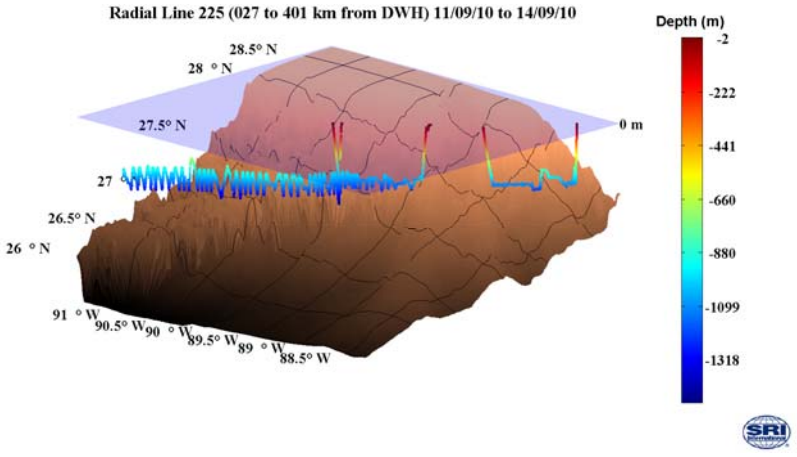
Provided by: Jeff Chanton, Florida State University

Deep Tow Surveys Southwest of MC252 (Sept. 2010)



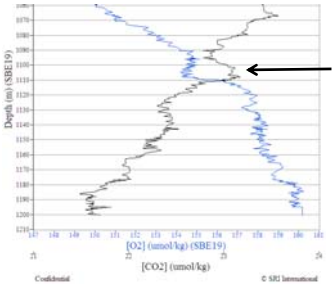
- Deep tow surveys of dissolved gases and VOCs with UMS in Gulf of Mexico
- UMS mounted on deep tow sled with CTD, sampling rosette, USBL, and multiplexer vessel to provide communication and power
- Sled deployed from A-frame of M/V *Arctic* for deep tow operations as part of Broader Gulf of Mexico Survey Cruises

Tow-yo Between 900 and 1500 m Along 225° Heading

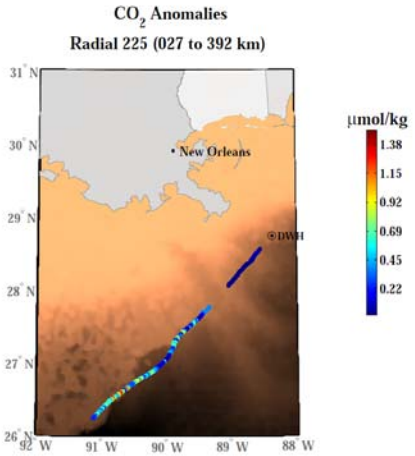


Plot of tow sled depth during deep tow transect

Anomalies in Oxygen and Carbon Dioxide at ~1100 m



O_2 decrease
CO_2 increase



Anomalies consistent with increased microbial activity* were found up to ~400 km from the Deepwater Horizon site

* Hazen et al. (2010) *Science,* 330, 204–208

Conclusions

- Need for in-water chemical monitoring and mapping
  - Wide variety of motivations
- In situ MIMS analysis
  - Simultaneous detection of dissolved gases and VOCs
  - Real-time information on chemical distributions
- Deployment methodologies
  - Towed (2-D or 3-D)
  - Vertical profiling (1-D)
- Application to subsurface spills
  - Real-time mapping of dissolved gases, methane, and volatile organics
  - Adaptive sampling
  - Guide water sampling strategies

Acknowledgments

- Staff at SRI International Marine Technology Program
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- CSA International Contract Agreement #2290 (BP Oil Company)

Note: The views and conclusions contained in this presentation are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the government.

Attachment 11
In the Midst of Disaster

April 20, 2010

- The *Deepwater Horizon* was a 9-year-old semi-submersible mobile offshore drilling unit. The rig was built by South Korean company Hyundai Heavy Industries and owned by Transocean and was under lease to BP since March 2008 to September 2013.
- It was drilling an exploratory well at a water depth of approximately 5,000 feet, located in the Mississippi Canyon Block 252 of the Gulf of Mexico in the United States about 41 off the Louisiana coast.
- 11 workers were killed, 17 injured.

Associated Press

Florida's Scientific Community Responds

- Oil Spill Academic Task Force formed by Florida Board of Governors Chancellor Frank Brogan to draw on depth of expertise. Eleven state universities, five private universities and two marine institutes.
- http://oilspill.fsu.edu/ created as a clearinghouse website to share data and information on the latest developments in the spill.

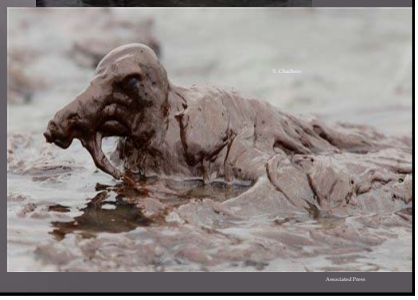
First Question: Where is the Oil Going?

- Robert Weisberg, Ocean Circulation Group's Network of buoys, sensors and computer models allow for the creation of forecasts. The Loop Current becomes a focus for Florida.
- Chuanmin Hu, Optical Oceanography Laboratory In 2009, discovered that NASA satellites could detect natural oil seeps in the Gulf, which appear as silvery glints. Applied to the spill, the satellite images quickly became a go-to source of information.

Second Question: What is Happening in the Gulf?

R/V Weatherbird II – USF's research vessel which operates under the auspices of the Florida Institute of Oceanography is the largest deepwater research vessel on Florida's west coast.

USF researchers embark on May 5 for a 12-day journey in to the spill zone along with scientists from the Florida Fish and Wildlife Research Institute. Voyage becomes part of the Natural Resources Damages Assessment, a program operated by the federal government to ascertain the impact of the spill and the well operators/owners responsibilities.



Plume and Gloom

- As *R/V Weatherbird II* arrives, the *R/V Bellows* departs to gather baseline data along the Florida shelf as concern about oil in the Loop Current grows. Concerns about subsurface oil detected by the R/V Pelican raise question of underwater "plumes".
- May 22-28 R/V Weatherbird II's second trip to the spill zone turns up evidence of vast clouds of degraded oil suspended at depth.

BP's Response :

"The oil is on the surface.

There aren't any plumes."

The Answers Put USF in Unchartered Territory

- The Gulf oil spill becomes a high-profile event where academic researchers are seemingly at odds with official government reports.
- Unified Command – BP, the U.S. Coast Guard, NOAA – push back on independent scientists drawing contrary conclusions on the existence of subsurface clouds of degraded oil.

The Media Storm

- Tampa is the nation's 12th largest media market. Soon major publications, network news outlets and international organizations are calling for expert opinions on the spill and watching our research cruises carefully.
- USF's modeling maps of the Loop Current are placed side-by-side the weather maps on The Weather Channel and at local television news casts. Researchers pitch in to handle the load of calls as both an opportunity to provide information to the public and a rare opportunity to educate about marine science.
- By late May, national and international media quickly seize up on the conflicting statements between NOAA, the government and academic scientists. A steady stream of interview requests become a flood of demands for information as the "conflict" of the story takes over.

The Camera Never Blinks

- On USF's biggest coverage days which centered around discoveries of the plumes and toxic oil in the sediments, USF's story reached daily audiences of upwards of 20 million people through coverage on all four of the major network evening news casts and CNN.


The amount of TV time local and national stations and networks devoted to covering USF's spill research totaled more than $10.1 million. Among those television programs who have sent crews to film at the college are ABC News, NBC Nightly News, CNN, PBS, the National Geographic and WDR, German Public Television.

National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling

- Fast-forward to Oct. 6 and the oil spill investigative panel headed by former Sen. Bob Graham's draft report

  "By initially underestimating the amount of oil flow and then, at the end of the summer, appearing to underestimate the amount of oil remaining in the Gulf, the federal government created the impression that it was either not fully competent to handle the spill or not fully candid with the American people about the scope of the problem. "
- The Graham Commission report specifically cites USF's bold, public approach to science as having changed the federal government's response.

USF/NOAA Confirm Subsurface Oil

Analysis of Hydrocarbons in Samples Provided from the Cruise of the R/V WEATHERBIRD II, May 25-26, 2010

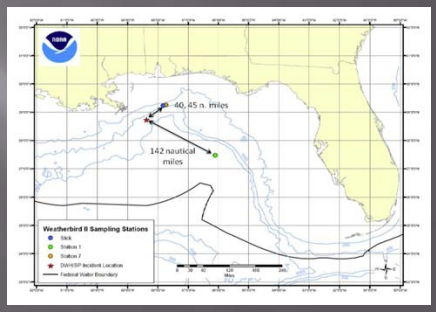
Robert Haddad, Ph.D.

Steven Murawski, Ph.D.

National Oceanic and Atmospheric Administration

Silver Spring, Maryland, 20910

Summary



Pieces Begin to Fall into Place

- FIO Receives $10 Million Grant "No Strings Attached" from BP to fund a rapid research response to the effects of the Deepwater Horizon oil spill on the Gulf of Mexico.
- Weisberg Testifies In Washington before the U.S. House of Representatives on gaps in the nation's scientific capabilities to respond to the Deepwater Horizon oil spill crisis.
- U.S. Rep. Kathy Castor helps USF obtain BP oil samples; David Hollander is first scientist to definitively connect plumes to BP well.
- USF Geologist Ping Wang provides to NSF a report showing oil threatening bird and turtle nesting areas; is first scientist to show media how oil has become buried beneath Gulf beach sands and distributed into tiny tar balls on beaches BP "cleaned."

Where the Research Stands

- R/V Weatherbird II returns Aug. 6 for third mission to the spill zone. Scientists discover oil buried in the sediments near DeSoto Canyon and evidence that spill has become toxic to phytoplankton, the base of the Gulf food web.
- Focus now on better understanding the nature of the subsurface clouds of oil, where they may go and their impact on the environment.
- 27 research projects funded by FIO throughout the state's marine science colleges, institutes and centers. USF/CMS received 5 of these Research projects totaling almost 1/3 of the total $10 million awarded.

The Focus for the Future

- The damage to the Gulf is top-down and bottom up. Large animals such as dolphins and turtles were affected but so were the microscopic organisms that make up the base of the food web.
- Much of the biological damage is hidden from view, but will reverberate up the food chain and affect the fisheries and marine life people value.
- There are direct toxic effects of contact with the oil overload layer.
- Even without direct toxic effects, the overlying "oil blanket" forms a barrier that impedes sediment re-oxygenation, resulting in dead zones for important sea-floor organisms.
- We will not be able to gauge the true extent of the total damage for many years.

The Takeaway

- The Deepwater Horizon oil spill has dramatically changed the role of academic science in times of environmental catastrophe.
- Graham commission working paper cites academic scientists as playing an significant role in providing an independent assessment of the spill that rose above BP's corporate interests and Washington politics.
- The next phase under the Clean Water Act is beginning as 5 of the USF/CMS Scientists will be interviewed by NOAA Law Enforcement and the US Dept of Justice next week.
- The penalty phase under the Damage Assessment Process is beginning.
- BP has set up process for allocating the remaining $450 million of their research funds over the next 9 years.
- USF is still and will remain involved in this important issue to the State of Florida.

Attachment 12
SURF Sustainable Remediation Site Database Initiative

SURF Database Initiative

SURF 16 / Tampa Meeting

Co-Chairs:	Steven Murawski Ray Lewis	
Members:	Lorraine Larsen-Hallock Mike Miller Scott Denson Dick Raymond	Paul Favara Carol Baker Pam Dugan Amanda McNally Neno Duplan

Database Initiative Report Out

Completed Actions…

- ✓ Develop strategy for planning & implementation
- ✓ Obtain support commitment from university

On-going Actions …

- Get Agencies involved (particularly EPA)
- Identify potential sites
- Develop list of target research questions
- Coordinate “metrics” with other SURF Committees
- Develop preliminary list of ‘data owners’
- Organize IIT involvement (coincide students start with SURF 17/Chicago meeting)

End Goals

End goal is for database to be used to…

1) **Establish precedent**
   a) Validate current & future remedies
   b) Expedite future remedy reviews & approvals
2) **Create a clearinghouse**
   a) Reference for improving sustainability of remediation
   b) Track industry progress & prove the business case
   c) Research & education tool
   d) Identify gaps and future needs

Illinois Institute of Technology

- Faculty engagement
  - Chicago-Kent School of Law
  - Stuart School of Business
  - Armour School of Engineering
- Solicit student interest; organized as independent study or research project
- Explore grant funding opportunities for research
- Joint publishing of article(s) on DB initiative

Hal Krent
Dean,
Chicago-Kent School of Law

Weslynne Ashton
Assistant Professor
Stuart School of Business

Paul Anderson
Assistant Professor
Armour School of Engineering

EPA Interest & Prospective Sites

- For purposes of prototyping, focus narrowed to
  - Region 5 area, and
  - Other sites with accessible & high quality data
- Prospective sites
  - Currently no Region 5 sites in EPA's GR list
  - Only one Region 5 site listed in SURF's whitepaper list
- Select sites that have 'legitimate' sustainability

Phased Approach

Feb-May	Preliminary Research & Initiative Validation
May -Aug	Phase 1: Research & DB Prototype Design
Aug-Jan	Phase 2: DB Prototype Development
Jan-May	Phase 3: DB Expansion

Preliminary Research & Initiative Validation

- Determine how other existing database efforts can be leveraged for SURF database initiative
- Develop the specific deliverables for each phase
- Develop milestones & associated timelines
- Secure on-going commitment for collegiate support
- Develop Phase 1 target research questions
  - How applicable is the US Green Building Council and the LEED programs?
  - Where will the DB be housed?
  - How will the DB be maintained post-development?
  - What are potential IP issues & options to mitigate?

Phase 1: Research & DB Prototype Design

- Identify desired categories of data
- Draft preliminary DB structure
- Identify data owners
- Acquire bulk data & sift through
- Prototype design (preliminary development)
- Confirm searchable metrics
- Coordinate interviews with government and industry representatives to support project

Attachment 13
Government Employees Outreach Initiative

SURF 2011 REGULATORY/GOVERNMENT OUTREACH INITIATIVE

SURF 16

USF, TAMPA, FLORIDA

BACKGROUND/HISTORY

- Formed in 2010
- Leadership – Carol Baker and Transition
- Purpose – expand SURF diversity and membership, increase interactions with regulators
- Developed Mission Statement
- Prepared Standard Letter to Agencies

BACKGROUND/HISTORY

- Agency Conflict?
- Legal Support
- Developed Presentation
- SURF Conflict? – No advocacy or lobbying
- SURF 15 Breakout

SURF 15 SUMMARY

- Developed key message points
- Targeted States/Agencies based on relationships
- Defined need to promote further education into Sustainable Remediation without advocating or lobbying for it
- Need to present case studies involving all 3 legs of sustainability
- Focus on what other agencies have done relative to social and economic metrics (NY, WI, etc.)

RECENT ACTIVITIES

- Presentations - Completed
  - DTSC/CAL EPA – Paul Hadley
  - NYSDEC – Dave Woodward
  - DNREC – Dave Ellis
- Presentations – Planned or Targeted
  - NASL– Rick Wice
  - EPA Region 10 – Nick Garson
  - National Research Council - Dave Ellis
- Meetings
  - PADEP – Dave Woodward

2011 PLANS

- Presentations
  - ASTSMO – April?
  - Others?
- Develop tracking system to document and communicate agency interactions
- Further define role that stops short of advocacy and lobbying
- Evaluate other options and arenas for facilitating regulatory involvement and membership in SURF
- Facilitated discussion
- Clarify Logo use

CONTACTS

- Dave Woodward
- Todd Martin
- Maile Smith
- Jake Torrens

Attachment 14
Technical Initiatives

SURF TECHNICAL INITIATIVES

WHAT'S NEXT?

CURRENT ACTIVITIES

- Framework Paper – SURF review complete, in editing
- Footprint Analysis/Life Cycle Assessment Paper – SURF review complete, finalizing text, into editing Feb 7
- Metrics Paper – Submitting to SURF reviewers
- Will be presented in Summer issue of Remediation Journal

NEW INITIATIVES

- Brainstorm our ideas
- Bucket ideas into TI focus areas
- Ideas further developed into a brief 1-2 page proposal:
  - what the TI would accomplish
  - time frame needed to complete accomplishment
  - Define “product” of TI
  - Why SURF should support TI proposal (alignment with mission of education and research)
- Need a champion to work with SURF team members to develop proposal
- Proposals will be reviewed by the Board
- Board may approve TI, request additional information, or decide proposal is not aligned with SURF’s mission

QUESTIONS TO HELP BRAINSTORM

- What technical resources are needed for sustainable remediation?
  - Reference material?
  - Detailed case studies?
  - Training?
  - New papers?
  - Surveys?

Attachment 15
Brainstorming List of 2011 Technical Initiatives

Brainstorming List of 2011 Technical Initiatives

Brainstorming Idea	Participant with Idea	Volunteer:	Todd Rees	Maile Smith	Karin Holland	Robert Armstead	Dick Raymond	Dan Watts	Count
		Category:	Case Studies	Outreach	Framework	Metrics	LCA	Other	
LEED type accredidation for sustainable remediation	Kevin McCoy							1	1
More focus on investigation and evaluation components and implmentation components - but don't recreate the wheel	Kevin McCoy							1	1
Take case studies through framework methodology	Karin Holland		1		1	1			3
Review available standards wrt to most applicable to remediation (a step past LCA/FA paper) - external review process? Is there a process we can adapt to increase stakeholder confidence in the results	Dick Raymond, Jamie Ginn						1		1
Impact reduction on the life cycle of a project - policy for impact reduction	Mohit Bhargava						1		1
Course material and offer webinars (stimulate outreach benefit) - similar to ITRC	Stella Karnis			1					1
Take on specific initiatives like coal combustion products	Todd Rees		1	1				1	3
Integrate sustainable remediation with sustainable development; More focus on social and economic benefits of sustainable	Karin Holland		1	1	1	1	1	1	6
Who owns SURF models, where do the live, can we develop our own process/flow	Jamie Ginn						1		1
Create a thought document - what would impacts of climate change be on remediation - e.g., impacts to landfills as function of	Dave Ellis			1					1
Perform general public outreach that is simple and conveys sustainable remediation concepts to nonpractioners (e.g., public).	Kevin McCoy			1					1
Develop a clearing house of sustainable remediation products (e.g., solar powered skimmers, green pipes).	John Simon			1		1			2
Collect comments and potential controversies/ resolution with papers -	Rick Marotte				1	1	1	1	4

Brainstorming List of 2011 Technical Initiatives

Create Friends of SURF (FOS), a group of regulatory agency personnel who have relationships with SURF members, to spread	Nick Garson			1					1
Regularly publish progress of technical initiatives using calendar.	Dave Woodward			1					1
Integration of SuRF-UK three-tier approach and six metrics for each (Tier 1, Tier 2, Tier 3).	Curt Stanley		1		1	1	1		4
Identify key issues and technical initiatives around those issues; create executive summary (one page, at a glance review) and	Curt Stanley		1	1	1	1	1	1	6
Continue involvement with RTM.	Curt Stanley			1					1
Generate statement of needs as a technical note in ES&T.	Pamela Dugan			1					1
Determine how to use sustainble remediation metrics in corporate sustainability reports.	Karin Holland			1	1	1			3
Perform a SURF pilot study; pool collective knowledge, take project from investigation to remediation phase, including reporting and followup. Quantify using all tools.	Maile Smith		1						1
Make business case study; consider publishing in a high--impact journal.	Mohit Bhargava			1					1
Determine how to integrate sustainability results into regulatory review.	Mohit Bhargava			1					1
Be on the cover of ES&T.	John Simon			1					1

Indicates idea that is applicable to more than one category

Indicates overall lead category for idea

Attachment 16
Academic Outreach Initiative

ACADEMIC RESEARCH IDEA GENERATION

- **Mission of SURF:** Maximize the overall environmental, societal, and economic benefits from the site cleanup process…
  - In part by advancing the science and application of sustainable remediation
- **Mission of the Academic Outreach Initiative**
  - Encourage academic participation in SURF as a means to promote the organization, establish linkages, and foster research and innovation.

ACADEMIC RESEARCH AND SURF

- **Advance the field** of Sustainable Remediation
- **Partner/collaborate with the academic research community**
  - Science and engineering of remediation
  - Triple bottom line leads to interdisciplinary connections well beyond the technical
- ***So we'll build a list of research ideas.***
  - Academic Outreach Initiative will process the results
  - Will lead to draft white paper on research needs

BASIC TENET OF GREAT IDEAS

- The best way to get great ideas is to get LOTS of ideas.
- The first measure of success is the number of ideas generated.

BRAINSTORMING TO JUMP START THE PROCESS

- We're going to have some QUICK idea generating sessions
- When I say "GO" please put your name on a sheet of paper, write down the question number, and jot down (legibly) as many ideas as you can in 3 for each question posed
- At 3 minutes, I'll ask for a QUICK verbalization of some ideas.
- Then we'll address the next question

TO THAT END..

- 1. Identify the **data** and **technology** gaps in Sustainable Remediation
  - ***What don't we know that we should know?***

SURF

TO THAT END..

- 2. Identify **opportunities** to improve current remedial technologies and develop new, more sustainable ones.
  - ***Which technologies are crying out for improvement?***
  - *How do we generate new ideas?*

SURF

TO THAT END..

- 3. Let's identify **departments** and **people** that are conducting or are capable of conducting applicable research.
  - ***What research are you seeing out there?***
  - *Consider both US and international.*

TO THAT END..

- 4. Let's identify **off-the-radar screen/ not obvious/** departments/universities/faculties that MIGHT offer some valuable research opportunities.
  - ***Who/what comes to mind?***
  - *SURF could foster cross-discipline collaboration.*