

spring tide period than that during neap tide. On the contrary, saltwater intrusions were weaker and stronger during neap tide period than spring tide period in the Modaomen and Huemn inlets in summer, respectively. The model results indicated that the current was controlled by seaward current driven by river discharge in Modaomen Inlet rather than the gravitational circulation and tide-induced current due to this large river flow during neap and spring tides period in summer. However, the gravitational circulation in Humen Inlet was strengthened due to the strongest stratification during neap tide in the wet season.

### Seasonal variability of saltwater intrusion in the Pearl River Estuary

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The seasonal variability of estuarine circulation, salinity stratification and saltwater intrusion in the Pearl River Estuary (PRE) were investigated in the study by a three-dimensional numerical model. The model was calibrated against with observed data during December, 2007 including salinity, current velocity and surface elevation. Some model experiences representing seasonal varying river discharge in different seasons were conducted. The model results shown that the PRE was dominated by a two-layer circulation with seaward current at surface and landward current at bottom. The saltwater intrusions in the PRE became worse during winter (dry season) and slight during summer (wet season). The differences of saltwater intrusion between spring and neap tide periods in winter and summer were studied as well. In winter, saltwater intrusion during neap tide was stronger than that during spring tide in Modaomen Inlet, however, saltwater intrusion was weaker during former period than that during latter period in Humen Inlet. The circulation and salinity stratifications in Modaomen Inlet shown that the gravitational circulation was strengthened due to the stronger stratification during neap tide that brought more saltwater landward in winter. But the circulation in the Humen Inlet was dominated by tide-induced current in this dry season indicated that saltwater intruded landward more easily during spring tide period than that during neap tide. On the contrary, saltwater intrusions were weaker

and stronger during neap tide period than spring tide period in the Modaomen and Huemn inlets in summer, respectively. The model results indicated that the current was controlled by seaward current driven by river discharge in Modaomen Inlet rather than the gravitational circulation and tide-induced current due to this large river flow during neap and spring tides period in summer. However, the gravitational circulation in Humen Inlet was strengthened due to the strongest stratification during neap tide in the wet season.

### Vegetation and the sedimentary patterns in various environments along the drainage area of the Red River, Vietnam

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The evolutions of delta and estuarine are firmly correlated to the water and sediment discharge of rivers, on which vegetation, climate, and human activities impact along the drainage area. The Red River, one of the large rivers in the Asian monsoon region, is necessary to know the sediment patterns relating to the various environments along the river. Data from 76 sampling stations in the field investigation, including vegetation, sedimentary environment, soil, physiognomy, and data of palynological, magnetic parameter and grain size analyses on samples in laboratory were compiled and analyzed to know the potential effects of vegetation, climate and human activities by the cooperated group of China, Japan and Vietnam. This paper specially summarized the results of the parameters of vegetation compositions, topography, magnetic susceptibility and grain size to show how the vegetation impacts on the sediment in various environment conditions.

The vegetation and sedimentary patterns clearly distinguished three basic subsystems along the drainage of the Red River, including the mountainous areas, the channel-floodplain-bank of river and the delta plain-flat. In the subsystems of mountainous areas, the primeval vegetation



distributes in vertical zones although it was intervened. There were tropic rain forest, monsoon rain forest, upland rain forest, subtropical evergreen broad-leaf forest, mountainous mossy forest, temperate broad-leaf forest, coniferous and broad-leaf forest, mountainous shrubbery and grassland from the bottom to the top of mountains. Pollen assemblages are well corresponding to the main components of forest in vertical zones. Both of total organic content and magnetic susceptibility in the surface sediments are highest in this subsystem. In the subsystem of channel-floodplain-bank of river, vegetation is characterized by hydrophytes and swamp plantgrass and shrub with scatters of tropical forest. The pollen assemblages in the different reaches reflected that river plays a more important role than wind in pollen dispersal from the upper reaches to the estuarine. In the subsystem of delta plainflats, vegetation includes the swamp forest and mangrove. Pollen assemblages of the surface sediments from this subsystem and the submarine delta can indicate that the hydrodynamic conditions highly co-effects on the pollen distribution with both local and regional vegetations.

In addition, great mounts of bamboo, pine forest and grassland contribute to the major secondary vegetations of those burned forests under which the soil shows the highest magnetic susceptibility. That means the large difference of magnetic susceptibility in the mountainous areas is not only related the vegetation effects but also the human activities with fires. Coherent to the more terrestrial sources, magnetic susceptibility in the channel-floodplain subsystem is also obviously higher than that in the flats and the predelta-shelf subsystem.

### **New foundations for restoration and adaptive management in the Chesapeake Bay watershed**

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The thirty-year effort to restore Chesapeake Bay has generated numerous scientific advances and new models for regional management of coastal resources. However, increased pressure on the watershed from a population that now exceeds 16 million residents continues to impair ecosystem health and slow the progress of restoration efforts.

Growing frustration on the part of the general public and policymakers has sparked calls for a greater focus on accountability and performance-based adaptive management to justify the large public investment. The scientific and management communities recognize the need for new approaches to address these challenges. Experience suggests that efforts must be better targeted, supported with an appropriate level of funding and administrative infrastructure and linked in an interdisciplinary manner. Among several examples of integrated approaches to management in the Chesapeake watershed, we focus on three specific efforts each is an attempt to build a new foundation for adaptive problem solving in an ecosystem context.

**Understanding thresholds.** Most scientists acknowledge that the Bay is unlikely to respond to restoration efforts in a simple, predictable manner. Instead, the Bay will cross certain ecological thresholds that may cause quick changes, either for worse or for better. One example of a threshold response is the catalytic growth of underwater grasses in response to improved water clarity. A new initiative has started to bring scientists and managers together to examine such nonlinear or threshold events and to help develop new predictive tools to monitor recovery, manage public expectations, and maintain a clear and confident approach to restoration.

**Managing fisheries.** Management of economically and ecologically important Bay fisheries has become increasingly more complex. The completion of a fisheries ecosystem plan for Chesapeake Bay has catalyzed an effort to implement regional ecosystem-based fisheries management. Success will depend on strong scientific analyses from a diverse array of participants and stakeholders to provide decision support tools for fisheries managers, tools that integrate factors extending across biological, geographic and socioeconomic boundaries. Success will depend on an inclusive structure that yields credible policy recommendations that managers can translate into tangible actions.

**Building local capacity.** The success of watershed restoration depends on decision making at the local level. On-the-ground solutions that result in measurable improvements in water quality and wildlife habitat on a small watershed scale will ultimately build the foundation of Baywide restoration. A new initiative is underway to develop a sustained interface between communities and relevant knowledge and technical service providers in the public, non-