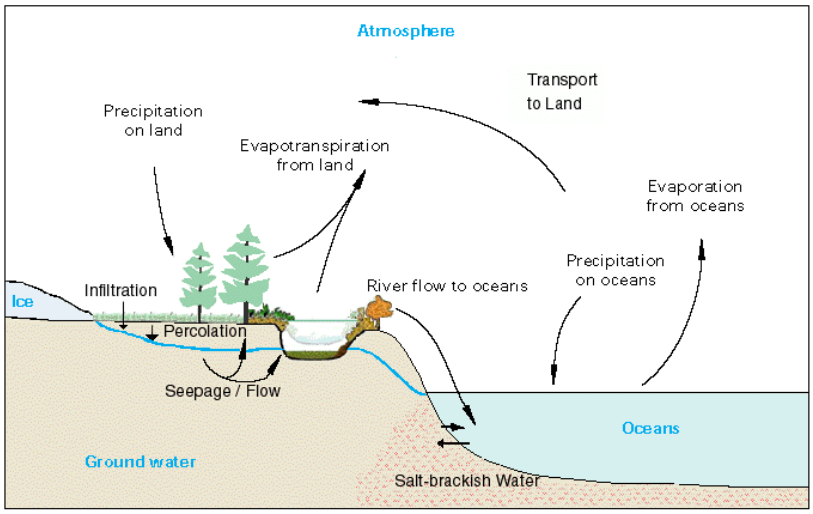
Groundwater-Surface Water Interaction

What is it?

Groundwater and surface water interact throughout the landscape, as depicted in the adjacent drawing. The conceptual landscape shows, in a simplified way, groundwater interaction with all types of surface water, such as streams, lakes, and wetlands, in many different terrains, from the mountains to the oceans.



Adapted from USGS (1998)

Why is it important?

The Bay Area is highly urbanized and is affected by the impacts from commercial, industrial, and residential development, including wastewater and industrial discharges, historic loss of wetlands, stream modification for flood control and urban development, and surface water and groundwater pollution from industrial solvents, petroleum hydrocarbons, pesticides, and legacy pollutants like mercury and PCBs. The Region has seen an expansion of residential development in the past twenty years, leading to the covering of natural recharge areas, greater storm water runoff, and alteration of stream channels and riparian zones. At the same time, water quality in rural areas is threatened by over-grazing, excess agricultural fertilizer and pesticides use, confined animal facilities, and expansion of sewage and septic systems. Historically, regulatory agencies have dealt with these issues through separate groundwater and surface water programs – a compartmentalized approach that often lacks important communication and coordination. Increased awareness of groundwater and surface water interactions can lead to improved water quality in the Bay Region. Integration of groundwater and surface water programs can help avoid problems that arise from managing one resource at the expense of the other particularly as solutions for better storm water management and TMDL attainment are sought.

What are we doing about it?

The Groundwater-Surface Water Interaction Workgroup of the Groundwater Committee was formed to facilitate better integration of groundwater and surface water programs.

Mission: To preserve, enhance, and restore water quality through a comprehensive understanding of the hydrologic cycle, with particular focus on collaborative engagement between surface water and groundwater staff, facilitating an increased knowledge of surface water and groundwater interaction.

Goals:

- Evaluate existing scientific knowledge and identify and fill gaps in our knowledge to establish the basis for eventual guidance
- Develop a long-term, integrated management approach, based on systematic, scientific assessment
- Develop blueprints for action (fact sheets)

Identification of Groundwater/Surface Water Threats and Issues
Mapping Needs
GW basin mapping Map of contaminated GW plumes
Educational Materials and Outreach
Develop fact sheets (internal, external) Develop posters (internal, external) Distribute existing publications Develop outreach materials for city planners Develop outreach materials to watershed groups (e.g., Friends of Creeks) Develop Watershed Atlas with groundwater aquifers identified Develop e-library of conceptual models
Research Needs
Thermal imaging along bay shore, creeks Understanding water chemistry in GW/freshwater & GW/saltwater mixing zones Wetland restoration projects (including streams/creeks) - developing GW/SW conceptual models Characterizing Bay Area-specific GW/SW interaction Quantifying impacts from groundwater pumping and surface water flows
Case Studies
Creek restoration in areas of contaminated groundwater Contaminated groundwater in tidally influenced areas Specific examples (e.g., Napa Flood Control Project; Suisun Marsh Diesel Spill)
Stormwater Issues
Infiltration Retention basins Stormwater management projects, including C-3 provisions (e.g., landscape treatments, residential downspout reconfiguration) Seattle/Washington State stormwater permitting examples Identification of groundwater recharge zones Effects of impervious surfaces
Interagency Issues
Information on other agencies' roles, responsibilities; coordination with EPA, Air Board, USGS, DTSC, DWR Addressing airborne impacts within the water cycle
Interdivisional Communication
Update Watershed Management Initiative chapter addressing GW/SW interaction Determine methods for bridging gaps at the Water Board Divisional cross training - education on surface/storm/groundwater processes Identify grant opportunities, outreach to target grantees
Sewage and Pollution Issues
Leaking sewer lines - coliform Residential leach fields - coliform Highway runoff - perchlorate, metals, oil and grease

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