



Napa County Realizing the Benefits of Integrated Groundwater and Surface Water Resources Management

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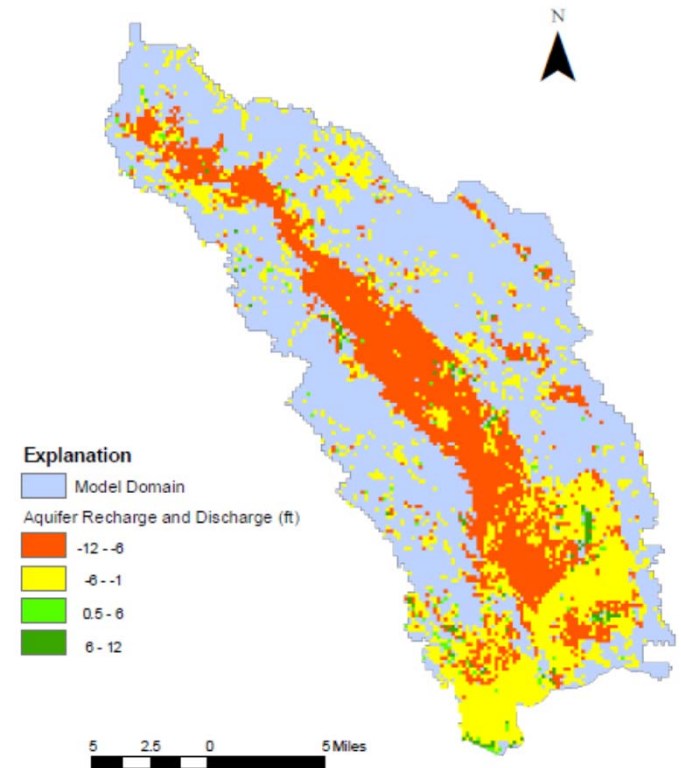
DHI

- Founded In 1964
- Private Not-for Profit Research and Consulting Engineering Company
- Research & Development, Annual Investment +100man Years
- 1200 Employees (700 Outside DK; 80% Ph.D./M.Sc.)
- Offices In 30 Countries
- Projects completed in +160 countries
- Active projects in 60-70 countries
- + **35,000** DHI Software licenses
- **4,500** organization in **130** Countries



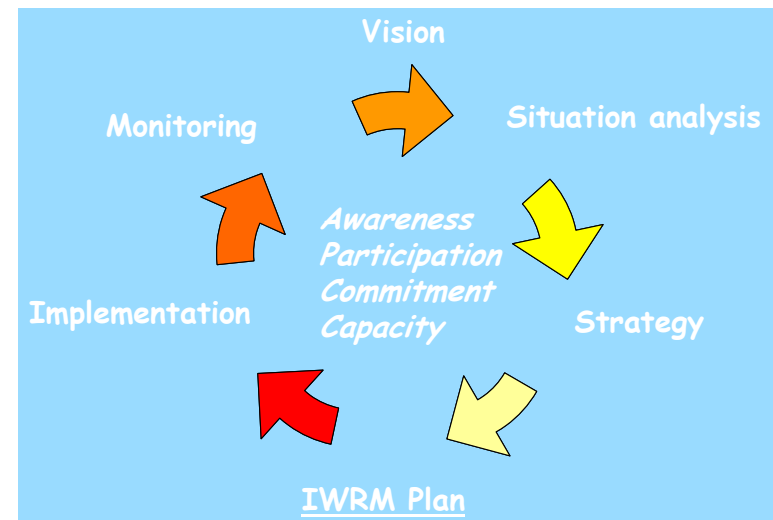
Current Water Management Needs

- **Understand Groundwater-Surface Water Interactions:**
 - Recharge dynamics, magnitudes and key areas
 - *Stream-aquifer dynamics:*
 - *Gaining/Losing reaches*
 - *Groundwater pumping*
- **Assess/Manage risks:**
 - *Conjunctive Use - Ground and Surface Water*
 - *Environment - Water quality – Stream Temperature*
 - *Flooding - Risk Reduction*
 - *Sediment (loading and delivery)*
 - *Climate Change Impacts*
 - *Fire*
 - *Litigation*



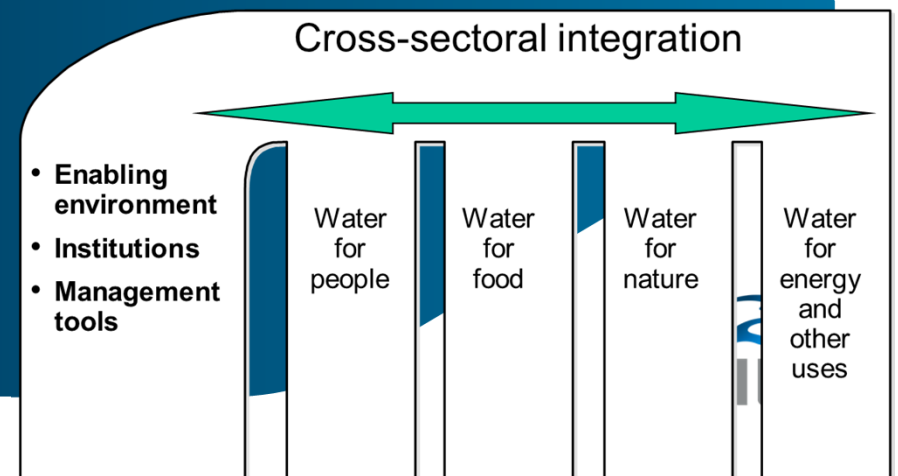
Benefits of Updating the MIKE SHE Model

- **Provide the County with an Operational Decision Support Tool**
 - Assess local and basin wide impacts
 - Support Design → e.g., Culverts/Infrastructure (size/locations)
 - Fisheries Salmonids
 - Stream Restoration
 - Recharge Potential
 - Assess/Improve habitat/ecosystem health
 - Permitting/Cumulative Impact Analysis
 - Guide data collection/monitoring



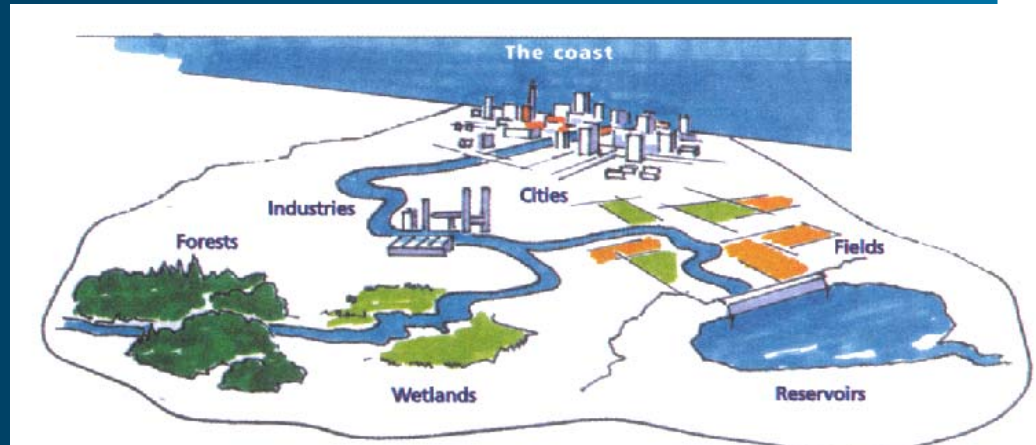
IWRM Framework

- Different uses of water are interdependent and should be considered together
- Water management decisions consider the effects of each use on the others
- Not only focus on development of water resources but consciously manage water development in a way that ensures long term sustainable use
- Water is an economic good



IWRM Framework

- **Integrated Water Resources Management Plan (IWRM) – or (IRWM):**
 - NAPA County IWRMP Framework:
 - BAIWRMP
 - WestSacIWRMP
- **IWRM Decision Support System:**
 - Basin Scale
 - Knowledge & Information Management System
 - Collect Right Data
 - Analytical Models & Multi Criteria Analysis
 - Web Portal
 - Institutional and Capacity Building



The basin is the basic management unit

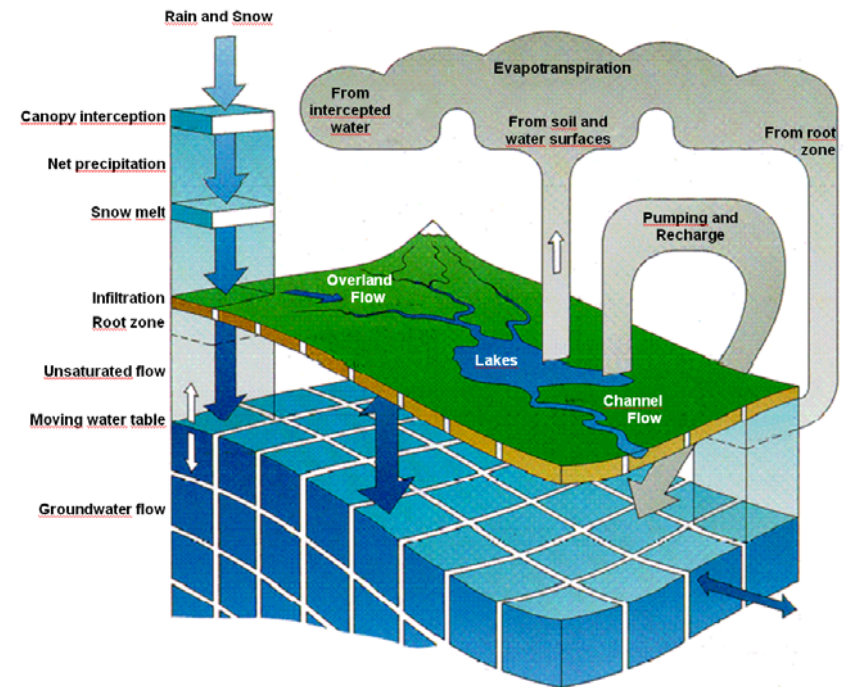
Existing MIKE SHE Model

OBJECTIVES:

- *Regional Integrated Groundwater-Surface Water Model*
- *Scenarios of Napa County General Plan*
- *Support BDR*
- *Water Quality –fate/transport*

LIMITATIONS:

- *Data*
- *Characterization/Conceptualization*
- *Methods*
- *No Uncertainty*
- *Training/Capacity*
- *Documentation.*

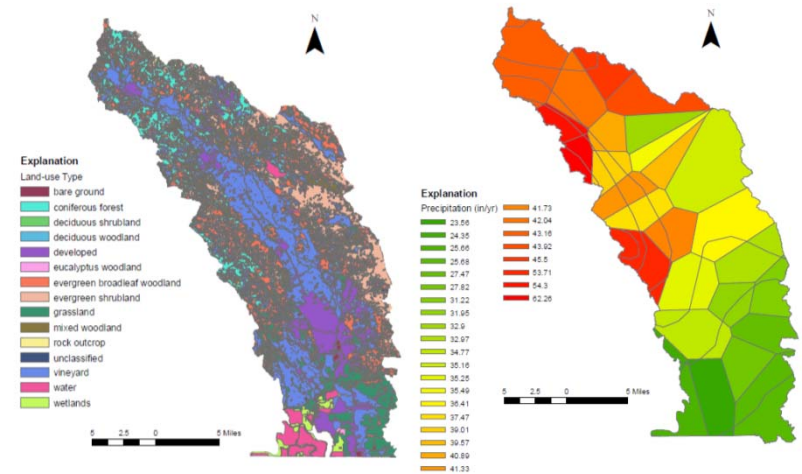
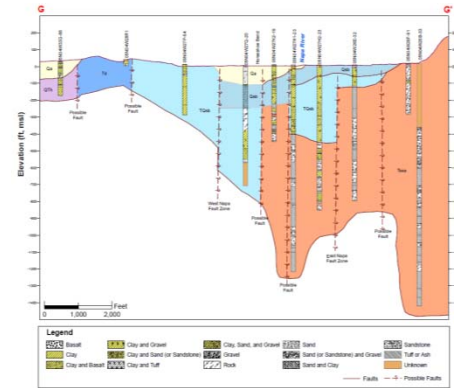


Proposed MIKE SHE Updates

- Extend Simulation Period 2000 to 2014
- Land use (*urban, soils, vegetation, irrigation*)
- Geology
- Climate Data (*New stations/distributions*)
- Stream and Groundwater data
- Infrastructure (*Reservoirs, Diversions*)



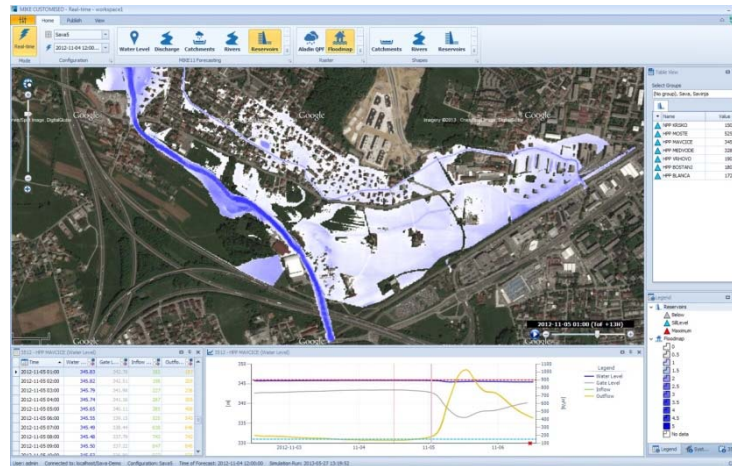
Improve Understanding of Current Conditions
 Better Predictions – Reduce Uncertainty
 Better Planning
 Better Decisions



Decision Support System will enable Napa County to ...

...get the full benefit of real-time monitoring and early warning systems

...manage, analyse and share data and information



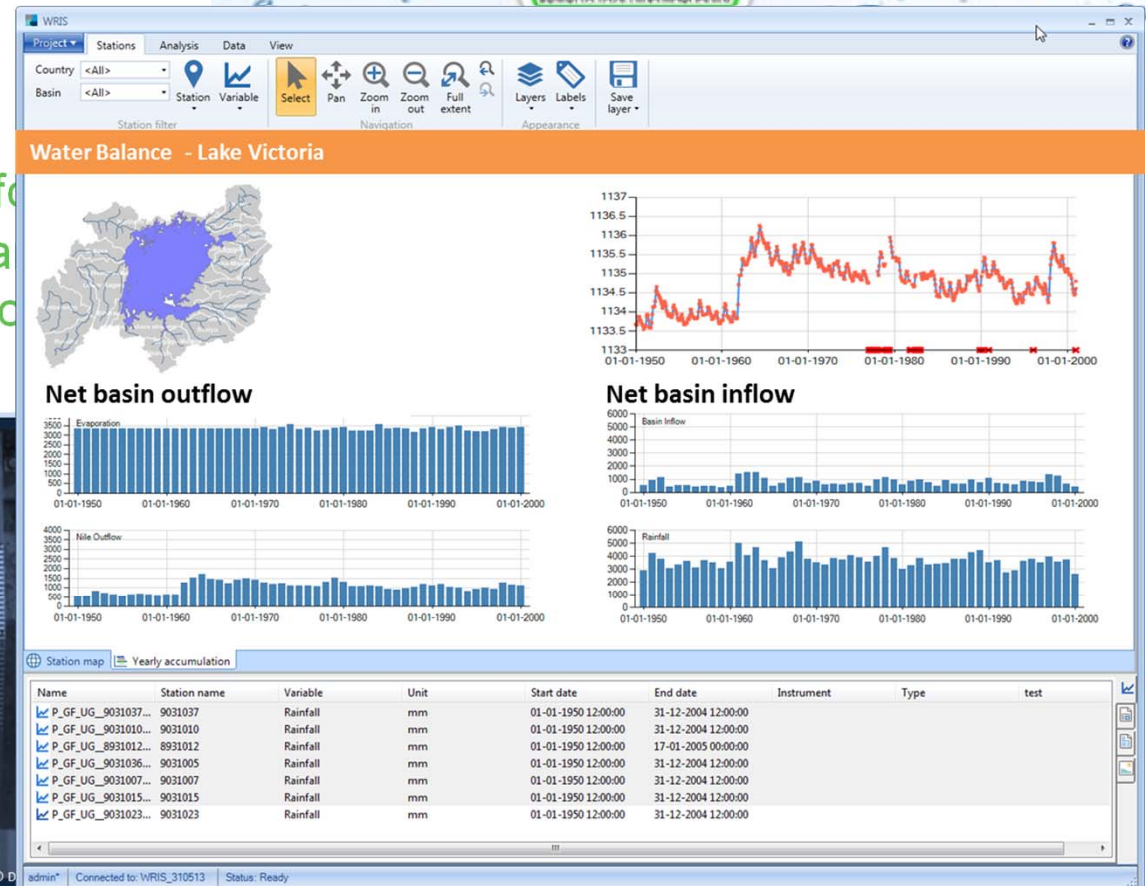
...optimise operations and planning

...make wise and robust water management decisions

Creating the basis for improved water management



WRIS – a Water Resources Information System for Monitoring Surface- and Groundwater and Water Quality in Lake Victoria Basin



Monitored Data

Hydro-meteorology

Water Resources

Water quality

Biodiversity

DATA

Australia River operations

Over 1,600km of river with two dams and thousands of water users. **One** river management system.



New South Wales, Australia

“ CARM is a world class development designed to maximise the efficiency of the Murrumbidgee River system.”

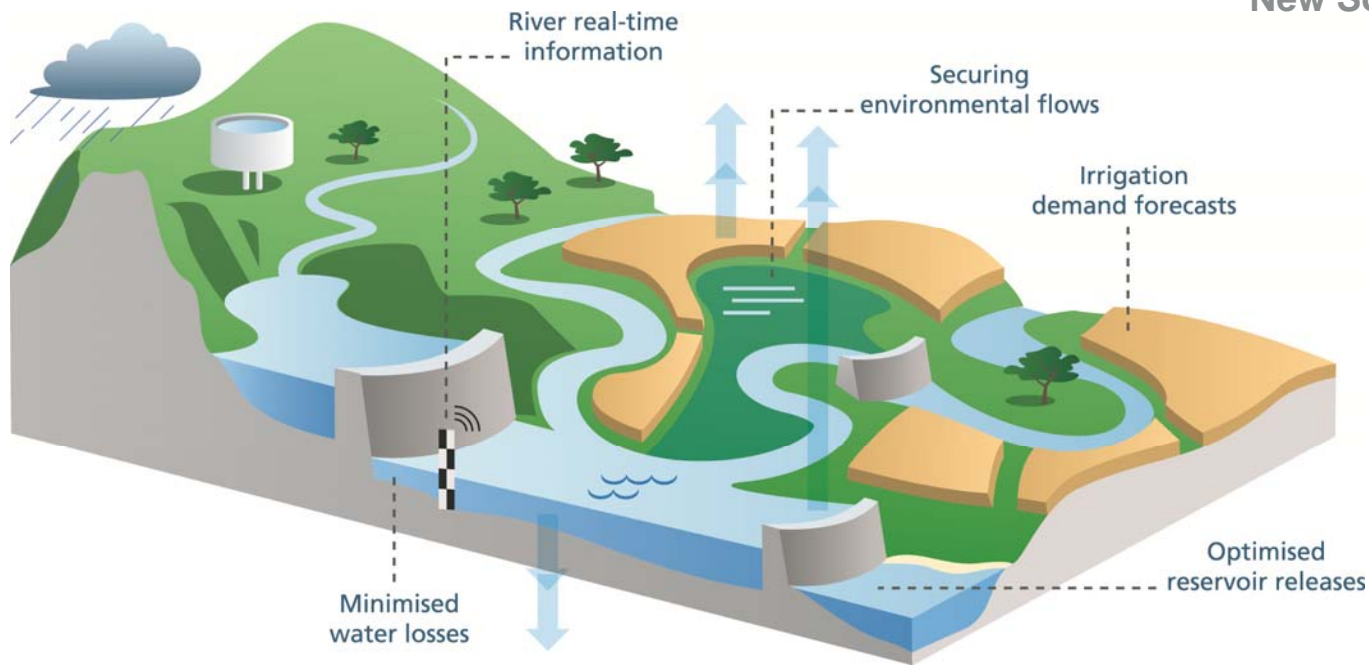
Brett Tucker, Chief Executive Officer, State Water Corporation, New South Wales, Australia



River Management



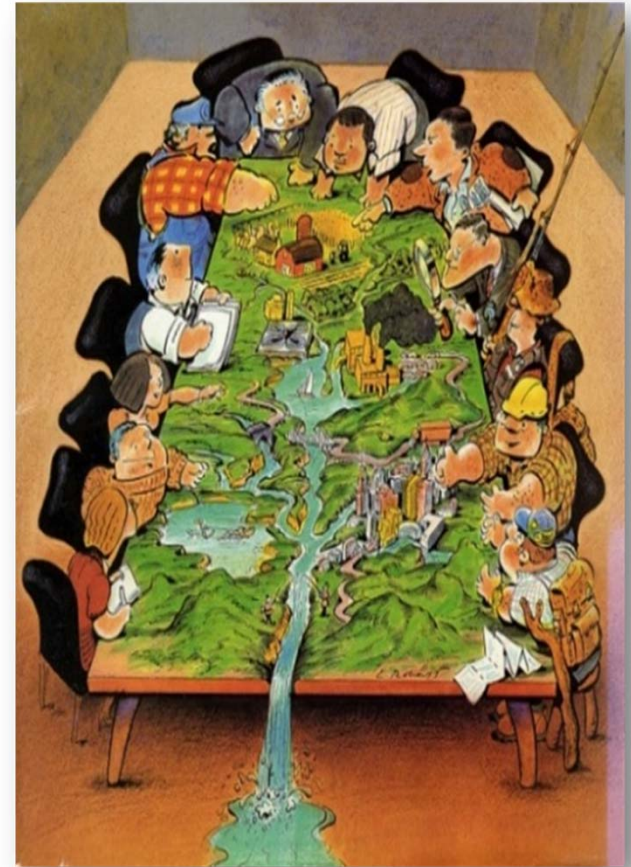
New South Wales, Australia



“The CARM project will make control of water flows more responsive and more precise.”
State Water Corporation

Napa County DSS

- Intuitive and customized user interface
- Making data and models available 24/7 via web
- Easy creation and simulation of scenarios
- Scenario results and data presented in user defined reports (online, mobile, PDF, etc)
- Transparent decision-making process enabling stakeholders to assess the results



Activities

- Update MIKE SHE Model
- Build Decision Support System (integrate with existing systems – WICC, etc)
- Build Capacity (training) – Sustainability
- Local Pilot-Scale Studies → *refine model, local issues*
- Build Credibility → Stakeholder acceptance/use

