# Planning for a Polder in the Netherlands

Integrating Water Management and Land Use Planning

**Location:** Polder "Bodegraven," Province of South Holland, the Netherlands
**Partners:** Institute for Environmental Studies, VU University Amsterdam; and Province of South Holland

***Context:*** The Dutch are familiar with polders--low tracts of land typically enclosed by dikes--and with their characteristic hydrological and land use challenges. The Bodegraven polder is a low-lying peat meadow area of some 4672 hectares (11,545 acres) in the Netherlands where water tables are controlled to enable multiple land uses. While Bodegraven has been predominantly used for commercial dairy farming, it is also important for its high natural, cultural and historical values. Bodegraven is currently facing a number of problems that will affect the sustainability of its land uses: ground subsidence, preservation of the peat meadow landscape, inefficient water management, poor water quality, and the changing economics of dairy farming. Multiple stakeholders are thus involved, including the local water board, the City of Bodegraven, the Province of South Holland, farmers' organizations and nature conservation organizations, as well as individual farmers, residents and recreational visitors. Consequently, the provincial authorities have started a planning process to review and adjust both water management practices and land uses in the area. The Spatial Analysis and Decision Support department within the Institute of Environmental Studies worked with stakeholders to develop and test participatory tools to support integrated land use planning and water management within this region amidst conflicting objectives.

***Project Description:*** The project team structured the planning process for Bodegraven into a series of three interconnected stakeholder workshops: 1) *Design*; 2) *Analysis*; and 3) *Negotiation*. In the *Design* workshop, the team defined three reference plan alternatives, stakeholder objectives, and evaluation criteria. The team used CommunityViz extensively during the *Analysis* and *Negotiation* workshops. A large touch-enabled interface, or 'touch table,' supported stakeholder participation in the workshops and acted as the main map interface to CommunityViz. In the *Analysis* workshop, the project team presented maps with thematic information about the region to increase the understanding of participants, who included both experts and stakeholders with varying backgrounds. Next, the project team used Scenario 360 to create scenarios. Each scenario consisted of a polygon-based suitability map in which the weights of each criterion were set according to participants' values. Participants could change the weights interactively using the touch table to adjust Scenario 360™ assumption settings. As the weights were changed, the results were dynamically updated and presented both on the touch table as a map, and on a separate screen as a bar chart showing aggregated scores for various criteria and

> *"CommunityViz and the touch table allowed us to integrate diverse knowledge and expertise about the region through the collective use of digital maps. The analysis and negotiation tools are strong mechanisms for understanding the problems of the region and the effects of potential strategies."*
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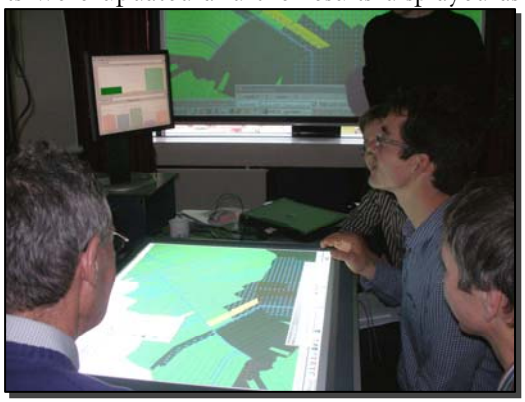
> — Rob Ligtenberg, Project Leader, Polder Bodegraven

objectives the participants had established. A set of weights and the corresponding set of value maps constituted the main product of this phase.

The *Negotiation* workshop supported the process of collectively changing the current land use situation of the polder into a new negotiated plan. Participants were the institutional stakeholders: the water board, the City of Bodegraven, the Province of South Holland, and nature conservation organizations. To support negotiation, the project team used multi-criteria methods to show trade-offs among stakeholder objectives. Stakeholders used Scenario 360 to adjust two kinds of trade-offs: qualitative and quantitative. Qualitative trade-offs were identified by selecting polygons that were "very suitable" or "very unsuitable" for each potential land use type based on their summed area and ranked Multi-Criteria Analysis (MCA) value. Quantitative trade-offs were identified by selecting polygons that would profit from a land use swap based on their actual MCA value. The next step was to change the plan. Stakeholders used their hands with Scenario 360 Sketch Tools to change land use patterns on the touch table as they discussed the changes. A land use palette allowed participants to assign new land uses to target parcels. As soon as the participants agreed on the land use changes made, MCA results were updated and the results displayed as bar charts on a separate screen in real-time. This illustrated how well the plan was performing, both as a whole and on the basis of each stakeholder's objectives. The negotiation session ended when the participants reached a compromise land use configuration, a plan that was accepted by all stakeholders.



***Technology and Tools:*** Software: CommunityViz 3.x: Scenario 360, including Sketch tools; and ArcMap™ customized functionality; Hardware: laptop with a separate large monitor screen and a DiamondTouch Table.

***Outcomes:*** This project ran for four years (2006 – 2010) and demonstrated the versatility of CommunityViz with regard to different settings of participatory approaches to land use planning. Together with the touch table, CommunityViz facilitated the engagement and integration of expert knowledge and stakeholder perspectives into the decision process of Bodegraven.

**KEY LINKS**

CommunityViz
http://www.placeways.com/communityviz
Institute for Environmental Studies
http://www.ivm.vu.nl/en
DiamondTouch Table
http://www.circletwelve.com/products/diamondtouch.html
Province of South Holland
http://www.zuid-holland.nl/foreign-visitors.htm

Sources: Gustavo Arciniegas, Institute for Environmental Studies, VU University, Amsterdam;
Paper: Arciniegas, GA, and Janssen, R, "Using a touch table to support participatory land use planning", Presented at 18th World IMACS/MODSIM Congress, Cairns, Australia, July, 2009 http://www.mssanz.org.au/modsim09/F8/arciniegas.pdf