

# Water in the landscape – a sandbox model

## Part I – Construction of the model

Overview: Required material	<a href="#">0:18</a>
Step 1: Set up of the aquarium	<a href="#">2:16</a>
Step 2: Mark sediment layers & installation of groundwater gauges	<a href="#">2:45</a>
Step 3: Installation of substrate filter	<a href="#">3:28</a>
Step 4: Fill lower aquifer with sediment	<a href="#">4:09</a>
Step 5: Installation of artesian well & filling of impermeable layer	<a href="#">4:54</a>
Step 6: Fill upper aquifer & shape local impermeable structure (loam lense)	<a href="#">6:32</a>
Step 7: Modelling the surface	<a href="#">7:32</a>
Step 8: Installation of water cycle components	<a href="#">8:25</a>
Step 9: Filling of the model with water	<a href="#">10:34</a>

## Appendix – Material list

Quantity	Material	Comment
1	Aquarium & stand	Clearly wider than deep. Example dimensions: 2m x 0.5m x 0.25m; stand height ~ 1m
2	Water tank	Capacity: 20 liter; for sprinkling and collection of water
3	Two-way valves	Mounted at sprinkling tank; Used for turning “rain” off and on.
1	Submerged pump with hose	Pumps water from the collection tank to the sprinkling tank. Example length: 3m
3	Plastic tubes	Perforated with holes (1-2mm), length: ~1m. Connected to the two-way valves. Used for sprinkling of the “recharge area” of the model.
2	Tube mountings	Made from plastic/wood or acrylic glass. Used to fix rain plastic tubes.
5	Halved plastic tubes	Halved lengthwise, used as “groundwater gauges”. Length depends on height of aquarium. Example length: 40 cm
5	Scale for gauges	Printed on paper, one for each gauge, scale in cm.
1	Funnel & hose	Used as water outlet at the “seaside” of the model. Example length of hose: 1m
1	U-connection & hose	Used as spillover at the “seaside” of the model. Example length of hose: 1m, U-pipe-fitting made of copper
1	Metal bar	Mounting for the outlet funnel and spillover.
2	Clamps	HOLDERS for the outlet funnel and spillover.
1	Two-way valve & tube	As basis for the artesian well. Example length of tube: 30cm
1	Mesh construction	Separates substrate from water at the outlet. Example: Made of two wooden bars and fine metal mesh.
	Gravel	Fine gravel up to 2cm diameter. Used for aquifers. Volume depends on model size. Example volume: ~0.2m <sup>3</sup>
	Sand	Used for aquifers. Volume depends on model size. Example volume: ~0.1m <sup>3</sup>
	Loam	Used for impermeable layer. Volume depends on model size. Example volume: ~0.1m <sup>3</sup>
	Model trees, figures...	For land surface design

Silicone sealant	Sealing of two-way valves/halved plastic tubes
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Ink & Injection & needle	For tracer injection & visualization of water flow.
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## Notes

- Volumes are roughly estimated and only valid for the dimensions of the example aquarium shown in the videos. It would be beneficial to use a smaller aquarium especially one that is smaller in depth, since most effects can also be explained with a smaller depth. Good aquarium dimensions would be for example: 1.50x0.5m x 0.25m (WxHxD)
- During the filling of the model with water make sure that the water level in all layers rises about the same. Otherwise there might be breakthroughs of the clay layer, due to different pressure heads within the layers.
- In our example the substrate of the upper aquifer was a mixture of sand and gravel. The ratio of sand and gravel determines the resulting water level gradients and the velocity of water flow in the model. A ratio that yields a good balance between clear visibility of the pathways and travel times of the colored water that are reasonable for demonstration purposes depends e.g. on the grain sizes and the dimension of the aquarium and should therefore be tuned by performing test runs.