

## Simulating the Spatial Flow of Carbon Sequestration Service: A Case Study of Tumen River Watershed

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The awareness of the carbon sequestration service concept has gained prominence in the decision-making process towards climate change. The inclusion of this issue to date mostly depends on the distribution output of carbon sequestration service value on a static map, whereas its transmission over the spatial units is too often unexploited. On the basis of the cellular automata model and laws of thermodynamics, our research visualized the spatial flow of carbon sequestration service via a grid matching method with a focus on the Tumen river watershed. We simulated flow directions ( $N = 9$ ) and potential fluxes ( $0 < F < 87.68$  t) of carbon sequestration service flow in the Tumen river watershed, and presented it on a grid map with 1km resolution. Our results illustrated that 15.28% of the trans-boundary watershed was recognized as non-flow regions, which possessed 136.71 Tg of total carbon sequestration. We highlighted how, depending on the spatial flow being simulated, the landscape patterns impact the carbon sequestration service flow, thereby influencing the local value of actual carbon sequestration service supply.

Keywords: Carbon sequestration service, ecosystem service flow, grid-matching