Service Path Attribution Networks (SPANs): Spatially Quantifying the Flow of Ecosystem Services from Landscapes to People

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Abstract. Ecosystem services are the effects on human well-being of the flow of benefits from ecosystems to people over given extents of space and time. The Service Path Attribution Network (SPAN) model provides a spatial framework for quantifying these flows, providing a new means of estimating these economic benefits. This approach discovers dependencies between provision and usage endpoints, spatial competition among users for scarce resources, and landscape effects on ecosystem service flows. Particularly novel is the model's ability to identify the relative density of these flows throughout landscapes and to determine which areas are affected by upstream flow depletion. SPAN descriptions have been developed for a number of services(aesthetic viewsheds, proximity to open space, carbon sequestration, flood mitigation, nutrient cycling, and avoided sedimentation/deposition), which vary in scale of effect, mechanism of provision and use, and type of flow. Results using real world data are shown for the US Puget Sound region.