Brain scans reveal that negative emotional responses can powerfully drive decisions to protect environmental resources

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Stanford scientists have found that viewing images of destructive land uses may motivate people to support environmental protection. Credit: Rachel Harris

Natural resources are under increasing threat from both human

development and climate change, and environmental economists have struggled to understand how the public assigns value to remaining pristine wilderness areas. In a recent study, environmental scientists and psychologists teamed up to explore how people make environmental decisions. To do so, the researchers used fMRI brain scanning.

They found that the brain's emotional circuits can powerfully influence environmental decisions. This suggests that emotional appeals may motivate environmental protection more than data-intensive arguments. The findings could provide a new approach to promoting sustainable decisions.

Nik Sawe, the lead author of the new study and a PhD candidate at Stanford School of Earth, Energy & Environmental Sciences, along with associate professor of psychology Brian Knutson, wanted to better understand how people value the environment, and what types of thoughts or feelings promote valuation of these natural resources.

To answer this question, Sawe and Knutson scanned the brains of 20 participants as they decided whether to donate money to prevent proposed environmental threats to state and national parks.

Viewing images of iconic parks such as Yosemite activated participants' nucleus accumbens, a part of the brain's reward pathway that tends to respond to enjoyable experiences, such as good food, music or financial gain. But viewing images of increasingly destructive proposed land uses activated the anterior insula, which tends to anticipate negative experiences, like the loss of money or physical pain. Activity in this part of the brain predicted that subjects would donate more money to protect the parks.

"Although people felt positive emotions toward iconic parks, their willingness to donate was really driven by the negative emotions they felt

toward the proposed destructive actions of a third party," Sawe said.

This desire to protect endangered wilderness areas seemed to drive people's willingness to donate. "This finding suggests that people were basing their valuations on the amount of outrage they felt toward damaging land uses, rather than their positive responses to the places themselves," said Knutson.

Using neuroimaging, Sawe and Knutson were able to decipher how different brain processes influence environmental decisions. "We could predict people's choices based on their neural activity, which revealed that emotional reactions may compete with cognitive cost-benefit analyses when people decide whether to donate to protect the environment," Knutson said.

Environmental decision-making may be unique due to this influence of negative emotions. The influence suggests that environmental philanthropy is driven by different factors than other charitable causes. "The value we derive from the natural world may be clearest only when that world is threatened," Sawe said.

The study marks a first step in using neuroscience to help understand individuals' pro-environmental motivations. Sawe and Knutson are collaborating on further studies of the neuroscience behind environmental decision-making, searching for new ways to motivate more sustainable decisions.

More information: "Neural valuation of environmental resources," *NeuroImage*, Volume 122, 15 November 2015, Pages 87-95, ISSN 1053-8119, dx.doi.org/10.1016/j.neuroimage.2015.08.010