

## Publication

### Soil sealing and unsealing: State of the art and examples

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Soil sealing for urban and infrastructure development constitutes the most intense form of land degradation and affects all ecosystem services. Researchers and policy makers have become aware of this fact and call for limiting development and compensating for new soil sealing with unsealing measures. In a literature review, we found that the state of research about the impacts of soil sealing is far more advanced than about the potential and prerequisites of unsealing. In practice, soil restoration after mining and construction activities as well as redevelopment or renaturation of abandoned industrial sites are increasingly important issues, but systematic research on the success of soil unsealing and restoration is rare. In particular, the development of soils and vegetation after unsealing and restoration measures as well as their potential to provide ecosystem services need more detailed investigation. In three case studies, we demonstrate that replacing a sealed surface with soil to restore ecosystem services is always beneficial for humans and nature. An indicatorbased mapping approach revealed the potential performance of different ecosystem services at former industrial sites in Switzerland. When unsealed sites are transformed to pioneer habitats, the intended vegetation may successfully be regained, but landscape connectivity is hardly enhanced due to increased overall landscape fragmentation. Our investigations show that with the techniques currently applied, the soil physical parameters in a restored agricultural soil developed favourably for crop growth within 15 years. However, unsealed soils are anthropogenic soils with reduced multifunctionality and protecting natural soil against sealing is always the better option.

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