



102 Things to Do With a Hole in the Ground

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Definitions

- **Reclamation:** restore the land surface to some sort of productive use
- **Restoration:** reclamation that is guided by ecological principles and promotes the recovery of ecological integrity; reinstatement of the original (pre-mining) ecosystem in all its structural and functional aspects
- **Rehabilitation:** progression towards the reinstatement of the original ecosystem
- **Replacement:** the creation of an alternative ecosystem to the original
- **Remediation:** treatment to reduce harm to humans and environment



Telling the Reclamation Story

- Fact: Many mined lands have second lives that benefit ecosystems and communities
- Fact: Many mining companies have excellent technical expertise in reclamation and redevelopment of mined lands
- Fact: Reclamation of many inactive and abandoned mines on public and private lands is being accomplished in partnerships between the private sector, civil society, and the government



A New Story

"landscape ecology and design can invent alternative forms of relationships between people, place and cosmos so that landscape architectural projects become more about invention and programs than the merely corrective measures of restoration"

Ref: Loures, L. and others, 2006, Strategies to Reclaim Derelict Industrial Areas, WSEAS Transactions on Environment and Development Issue S. Vol. 2. 2006



101 Things to Do With a Hole in the Ground

- 2009 Book by Georgina Pearman , published by the Post-Mining Alliance in association with the Eden Project in Cornwall



Image from: edenproject.com



Image from Pearman, 2009



The Eden Project

- Educational charity in Cornwall
- World's largest greenhouses
- China clay mine
- 1M visitors per year
- Environmental education facility for sustainable approaches to living
- 700 staff and volunteers
- Economic impact of £100 million /yr since 2001
- Unstable pit 15m below water table, supports 4,700 taxa from around the world



Eden Project in Boldava, Cornwall

Image from Pearman, 2009



Shopping Center

- 4th largest shopping center in UK
- Chalk quarry owned by Blue Circle
- 330 shops, 40 restaurants, 13 movie theaters
- Employs 7,000 people
- 27 million visitors/year
- 18 miles SE of London



Bluewater Shopping Center, Kent, England

Image By Badudoy - Own work, CC BY 3.0,
<https://commons.wikimedia.org/w/index.php?curid=3618063>



Bioreactor Landfill

- Open pit Cu-Pb-Zn mine
- 250 km SW of Sydney
- Largest bioreactor in the world, privately owned and operated (Veolia)
- Optimize biological degradation rates of organic waste to produce methane for “green” energy
- 20% of Sydney’s waste per year (6 55-car trains per week)
- Provides compost for mine reclamation, aquaculture
- Windfarm
- Proposed new mining adjacent to the site



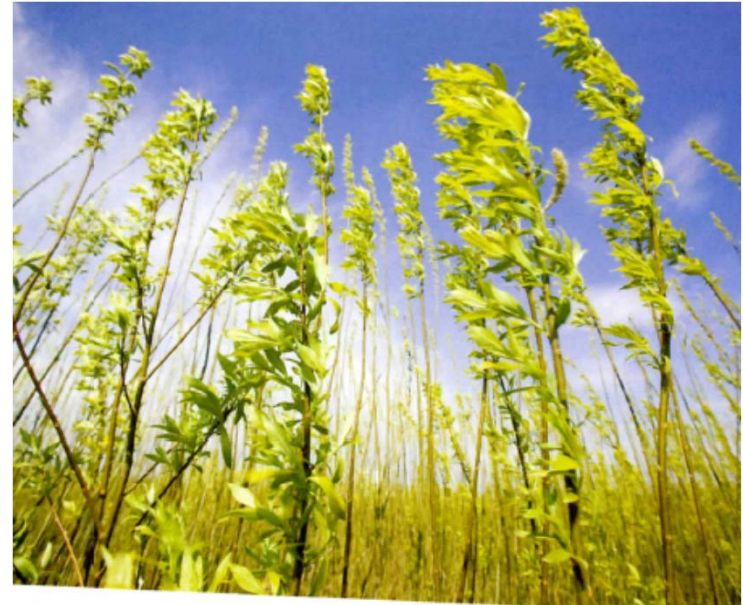
Woodlawn Cu,Pb,Zn Mine, NSW
Australia operated 1978-1998

Image from
<http://www.theswitchreport.com.au/business/ongoing-evolution-veolias-woodlawn-eco-precinct/>



Energy

- 10,000 hectares of coal mine land for willow and poplar growth
- Biomass for municipal heating
- Crops act as bridge to restore soil quality and create environment for other crops and species in future



Biomass, Dinslaken, Emscher Park, Ruhr, Germany

Image from Pearman, 2009



Novel Solar



Floating solar panels to reduce evaporation
Membrane mounted panels for slopes (at
Biosphere 2 and FMI Sierrita)



Sports

- Prosperstrasse coal slag heap
- Turned into indoor ski slope
- Ski 365 days/yr
- Temp = -1°C
- 640 m long, 30m wide
- Alpincenter, Bottrop, Ruhr, Germany



World's longest indoor ski slope, Ruhr Germany

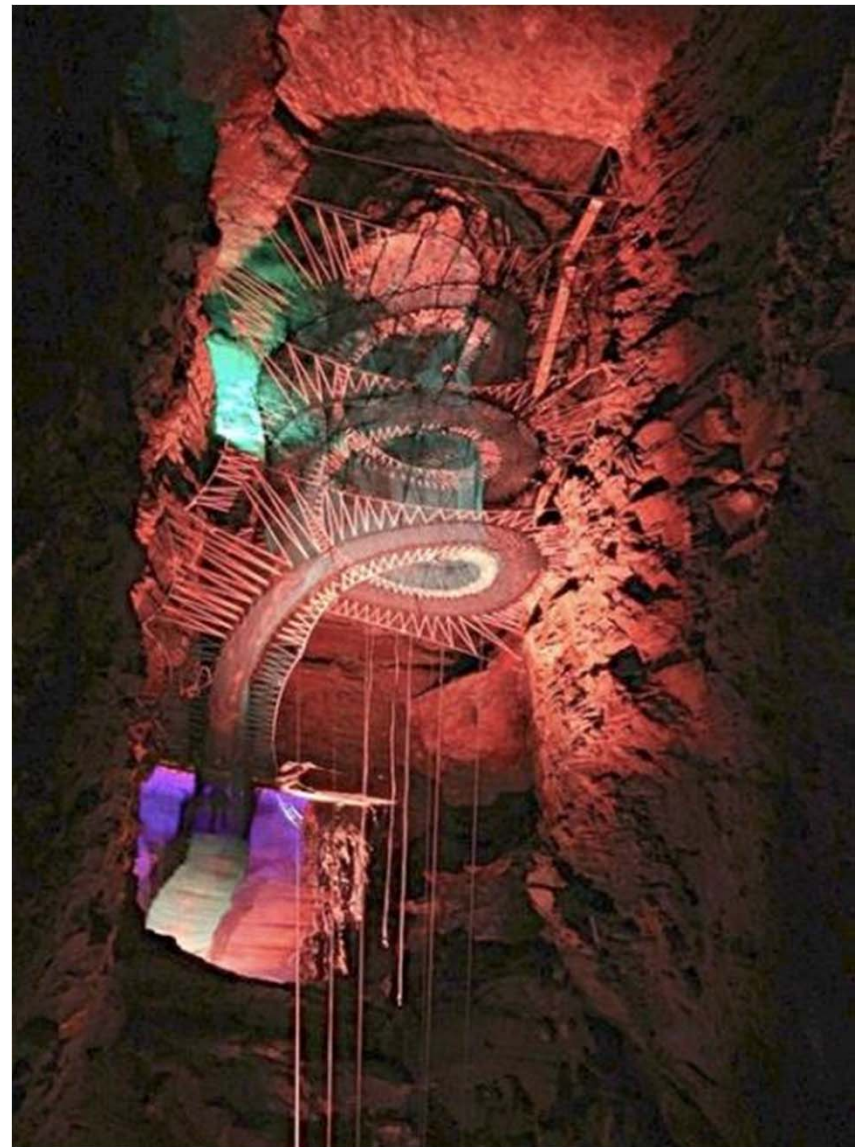
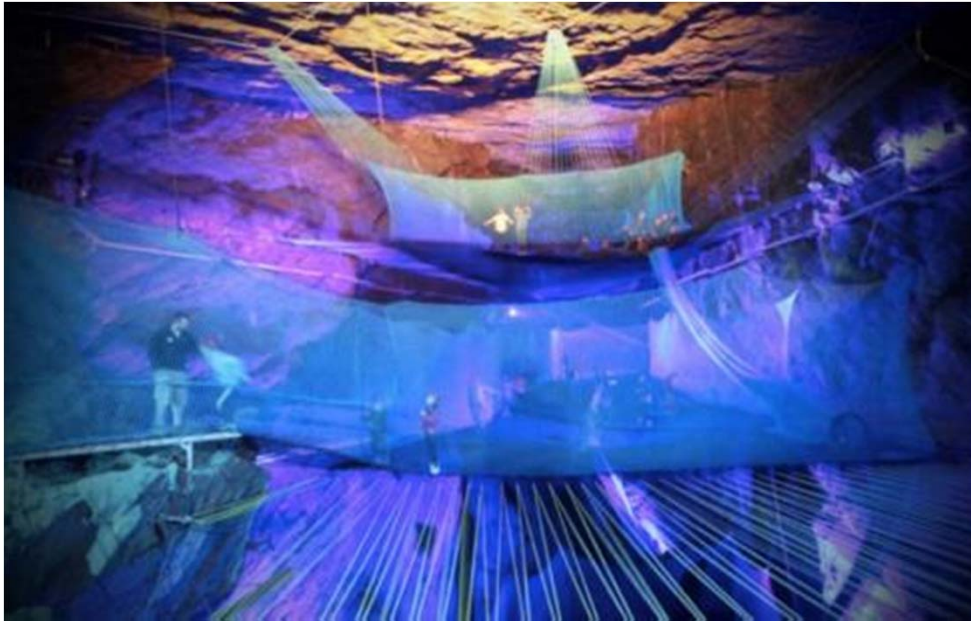
Image from Pearman, 2009





Atkinson, IL, ATV/Dirt Bike facility on abandoned coal mine land





176 yr old Welsh slate mine turned into
trampoline park.
Trampolines linked by 18m slides

Stopes the size of St. Paul's Cathedral
www.mining.com



Biodiversity

- Titanium dioxide mine
- 25 year restoration and monitoring program
- Restored a sustainable dune forest system



Richard's Bay South Africa

Image from Pearman, 2009



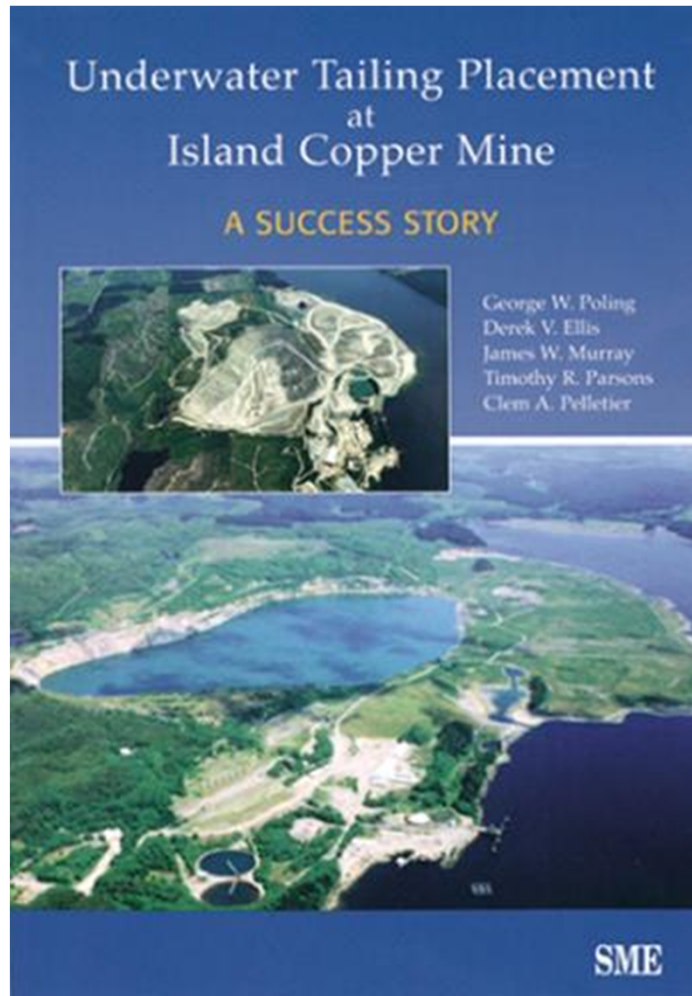


Flambeau Mine, Ladysmith, WI
Cu-Au-Ag Mine operated 1993-1997 (original plan was 22 year mine life)
10% Cu grade, 181,000 tons Cu produced
181 acre footprint (size of 18 hole golf course)
Pit was backfilled, 10 acres set aside for wetlands,
32 acres for industrial development



<http://flambeaumine.com/visitsite/naturetrails.html>





- Island Copper Mine on Vancouver Island – at end of mining Dec 31, 1995. 1B tons mined 1970-1995. Reclaimed



Sources:
Robertson Consultants
Rescan Environmental Services
University of Victoria Archives

Recreation and Housing

- Former sand and gravel quarry
- Turned into a golf course while mine was still active
- Added housing adjacent to the golf course

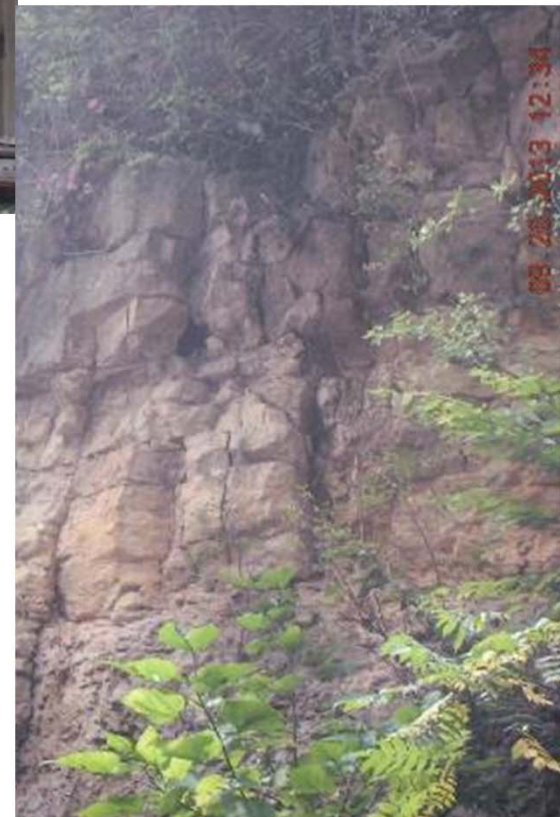


The Pines golf course, Marana, AZ





Living History park, former limestone quarry
along Mississippi River at Fulton, IL





Butchart Gardens- Victoria, BC (former limestone quarry)

Image Source Page: <http://ez.aminus3.com/image/2008-05-30.html>





Thorpe Park is a theme park located in Chertsey, Surrey, England, UK. It was built in 1979 on the site of a gravel pit which was partially flooded with the intention of creating a water based theme for the park.



www.thorpepark.com



EcoPark

- Old tailings storage facility for Fresnillo plc
- Pb-Zn-Ag mine in Fresnillo, Zacatecas, Mexico



EcoPark in Fresnillo, Mexico



EcoPark



Animal Rehabilitation Center



On former copper cementation site
Fresnillo HQ, Fresnillo, Mexico



History and Recreation



Stabilize buildings at St. Joseph, MO
Lead mine

Popular mountain bike trail on tailings



Uranium

- Breccia pipe uranium mines north of Grand Canyon
- 0.64% U_3O_8
- 19 million lbs produced by Energy Fuels Nuclear from 1980-1990
- Mines have been backfilled and ecosystems restored



Hack Canyon Uranium Mine, Arizona
Images courtesy of Karen Wenrich



Uranium



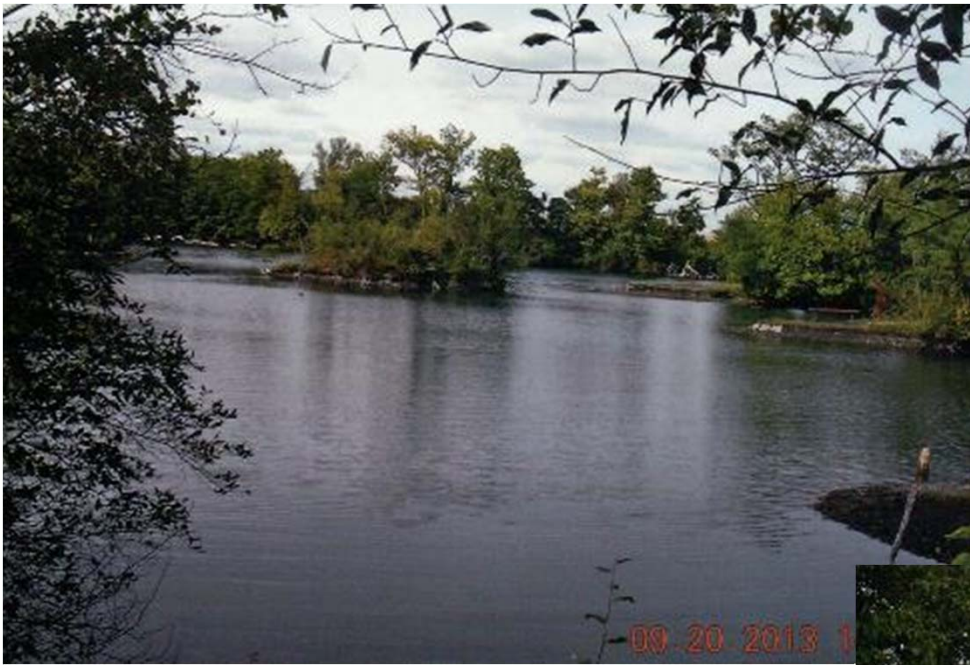
*Pigeon Mine during production
November 1989*



*Pigeon Mine after reclamation
October, 1993*



Spontaneous Reclamation



Abandoned coal mine land, owned by Isaac Walton League and Ducks Unlimited, Atkinson, IL





Reclaimed coal mine land near Victoria, IL





Reclaimed coal mine land near Victoria, IL



Re-Mining Historic District



ARD at World's Fair Mine near Patagonia, AZ
Hermosa Project would use and treat AMD
and backfill historic mine workings



Conclusions

- Many ways to re-imagine the second life of a mined site
- Costs can be shared and in some cases recovered
- Private sector takes responsibility for their lands and new mining in old districts can help remediate inactive or abandoned mines
- NGOs and private companies have been effective partners for reclamation and re-development
- Each situation is unique but can learn lessons from other sites; need to empower local solutions





Thank you!

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