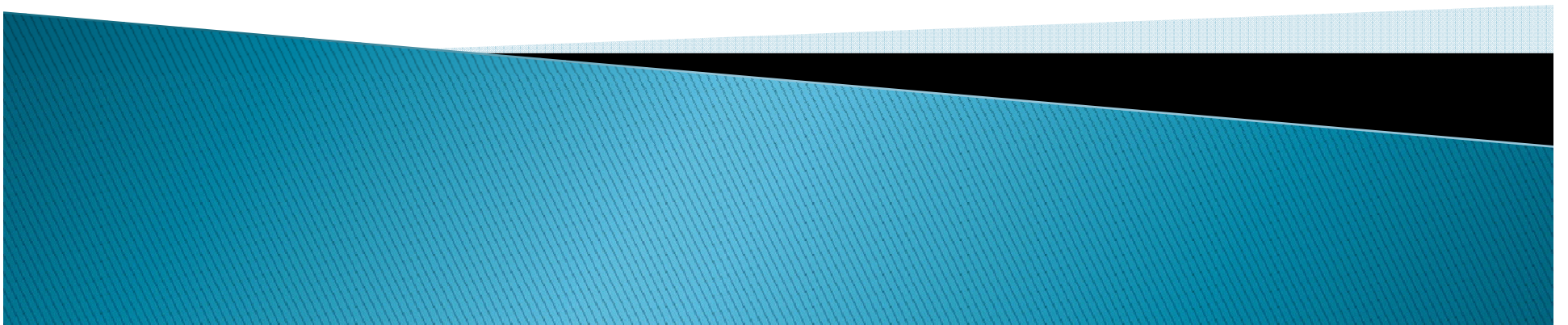


**what is a civil engineer?**



# now this sounds exciting...

- ▶ Civil engineering is the oldest engineering discipline after military engineering and it was defined to distinguish it from military engineering. (*wikipedia*)
- ▶ Civil Engineers design ...projects, then direct the work of drawing plans, writing specifications and preparing final cost estimates.  
..prepare deeds, property descriptions and right-of-way maps (*CA Occupational Bureau*)
- ▶ Civil engineers design ... roads, buildings, airports, tunnels, dams, bridges, or water supply and sewage systems. (*Bureau of Labor Statistics*)

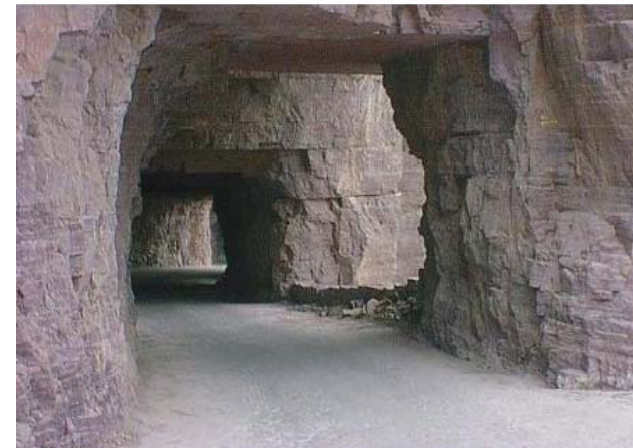
Wastewater  
Plant



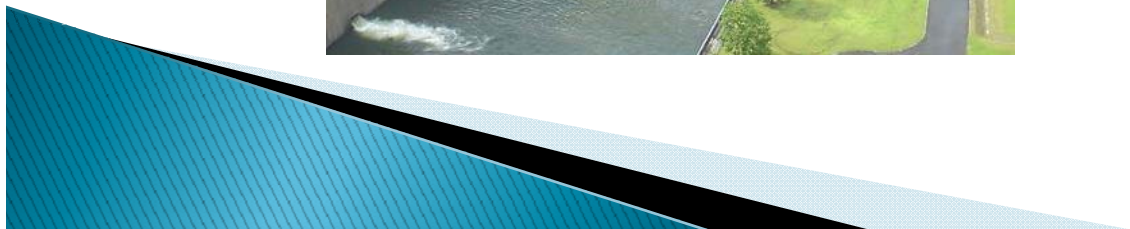
# six areas of civil

- ▶ environmental
- ▶ geotechnical
- ▶ structures
- ▶ transportation
- ▶ water resources
- ▶ materials / pavement

Gualiang Tunnel  
(in Taihang Mountains, China)

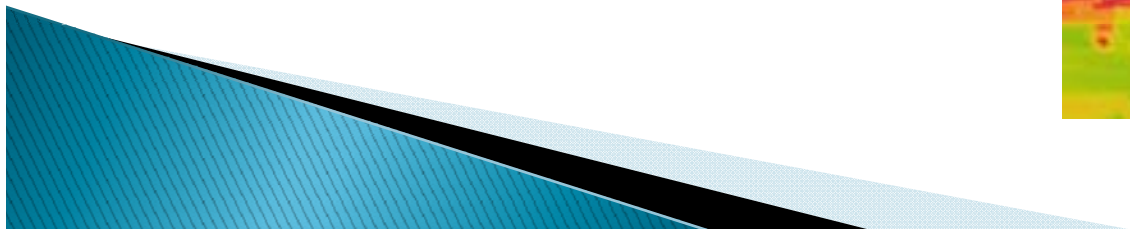


*"Before 1972, the path chiseled into the rock used to be the only access linking the village with the outside world. Then the villagers decided to dig a tunnel through the rocky cliff. Led by Shen Mingxin, head of the village, they sold goats and herbs to buy hammers and steel tools. Thirteen strong villagers began the project. It took them five years to finish the 1,200-metre-long tunnel which is about 5 meters high and 4 meters wide. Some of the villagers even gave their lives to it. On May 1, 1977, the tunnel was opened to traffic."*



# but what about tomorrow?

- ▶ project management
- ▶ life cycle analysis
- ▶ real-time sensor systems
- ▶ rehab
- ▶ energy systems
- ▶ sustainability
- ▶ climate change





# life cycle analysis

- ▶ cradle to grave analysis
- ▶ ecosystem impacts
- ▶ material design
- ▶ energy systems

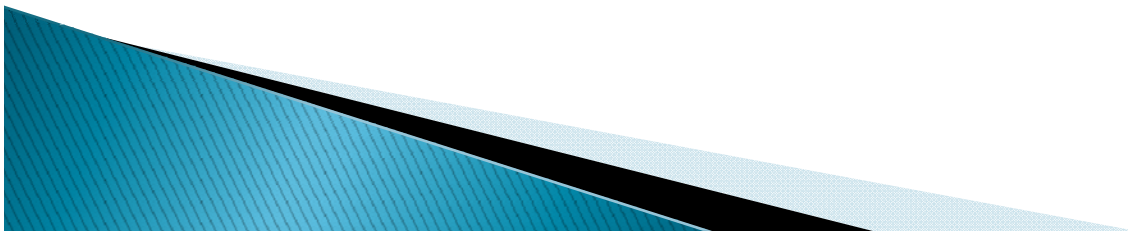
## *skills*

- collaborative
- good with systems
- integrator
- quantitative
- adaptable
- detailed, detective

Fig 1: Structure of the Life Cycle Assessment ( LCA)



# life cycle analysis

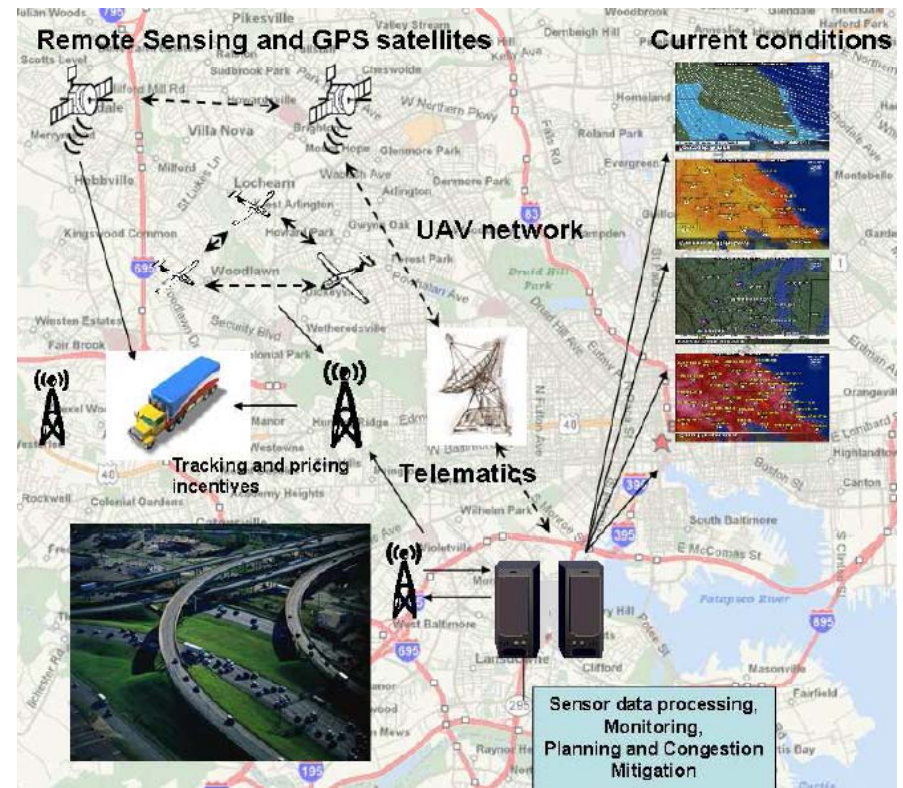


# real-time sensor design

- ▶ congestion pricing
- ▶ structural monitoring
- ▶ ecosystems
- ▶ emergency notification

## *skills*

- collaborative
- good with systems
- quantitative
- software/hardware
- comfortable with unknowns



# rehabilitation

- ▶ aging infrastructure
- ▶ ecosystem impacts
- ▶ natural disasters

## *skills*

- collaborative
- good with systems
- quantitative
- culturally aware
- environmentally knowledgeable

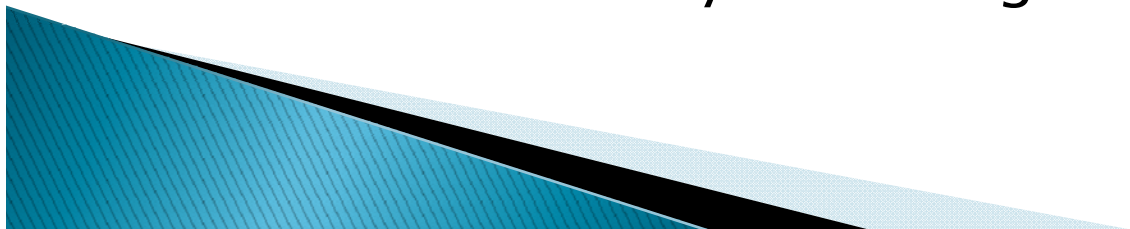


# energy systems

- ▶ community design
- ▶ passive energy systems
- ▶ environment impact

## *skills*

- collaborative
- good with systems
- integrator
- quantitative
- culturally aware
- environmentally knowledgeable

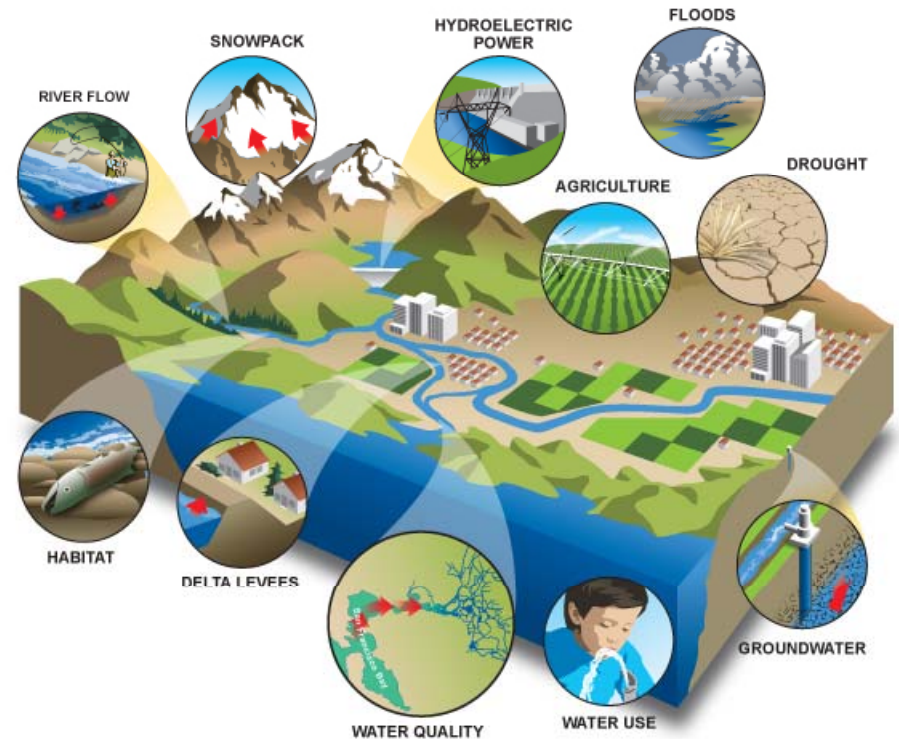


# climate change

- ▶ community design
- ▶ energy systems
- ▶ environmental impact
- ▶ natural resources

## *skills*

- collaborative
- good with systems
- integrator
- quantitative
- environmentally knowledgeable
- embrace risk
- adaptable



# the next generation of civils

