Dams

Water News

Dams: costs/benefits

Positive

- economic growth
- food production
- surface water enhancement
- recreation enhancement

Negative

- loss of wildlife habitat
- destruction of river corridors
- displaced peoples
- methyl mercury

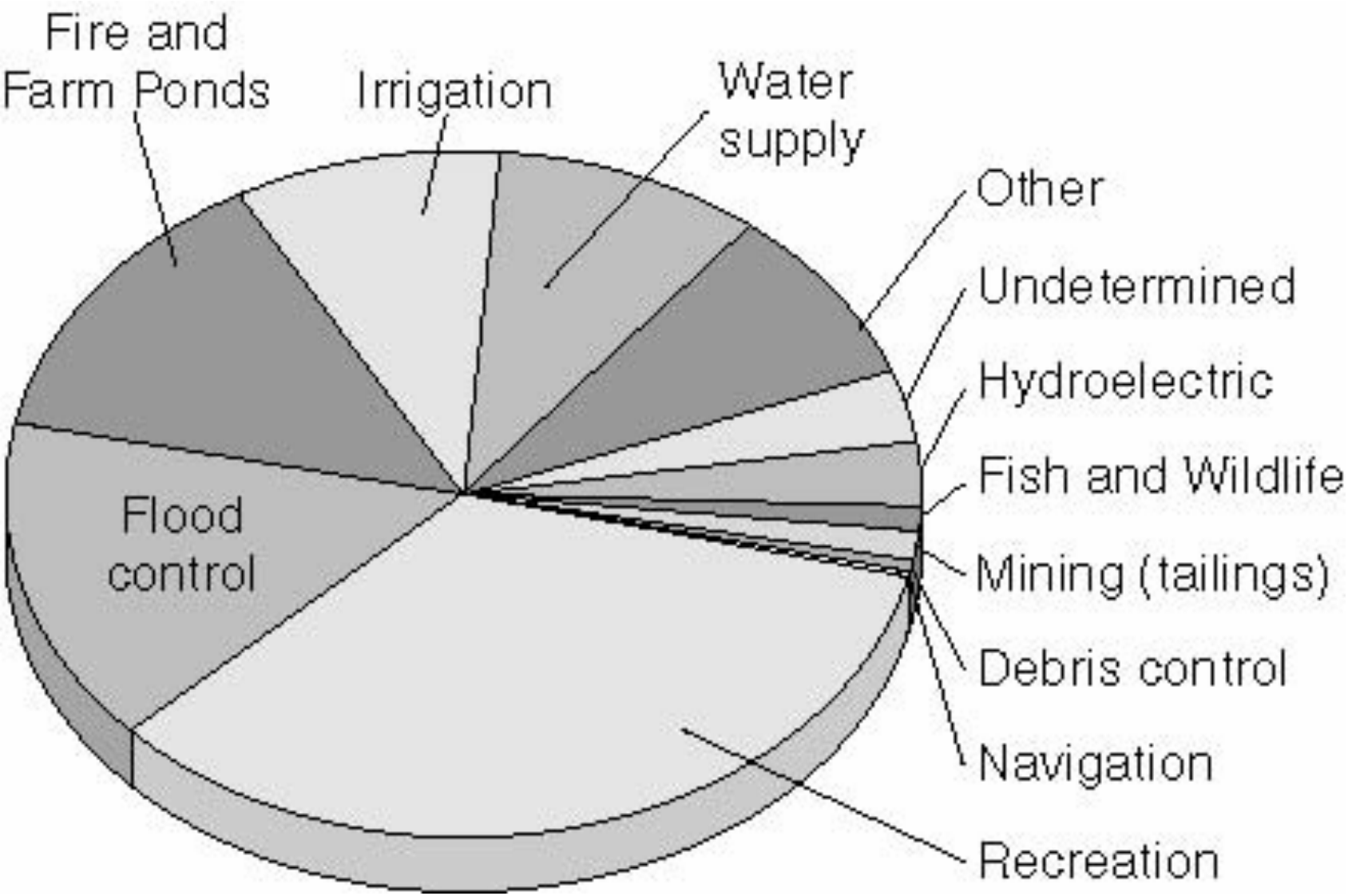
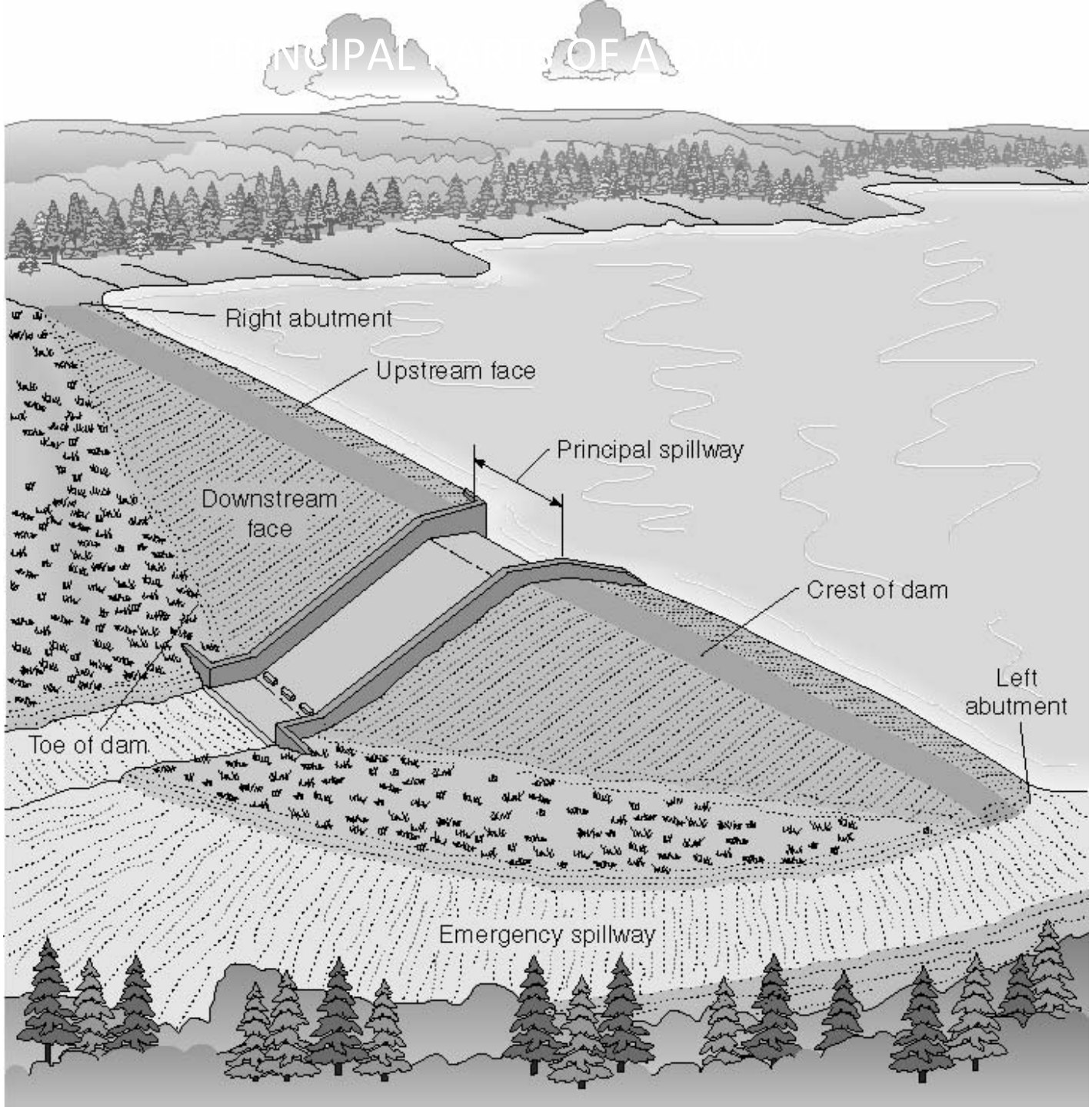

Fire and
Farm Ponds
Irrigation
Water
supply
Other
Undetermined
Hydroelectric
Fish and Wildlife
Flood
control
Mining (tailings)
Debris control
Navigation
Recreation

TABLE 7.1 Primary Purposes of Dams in the United States, 2001

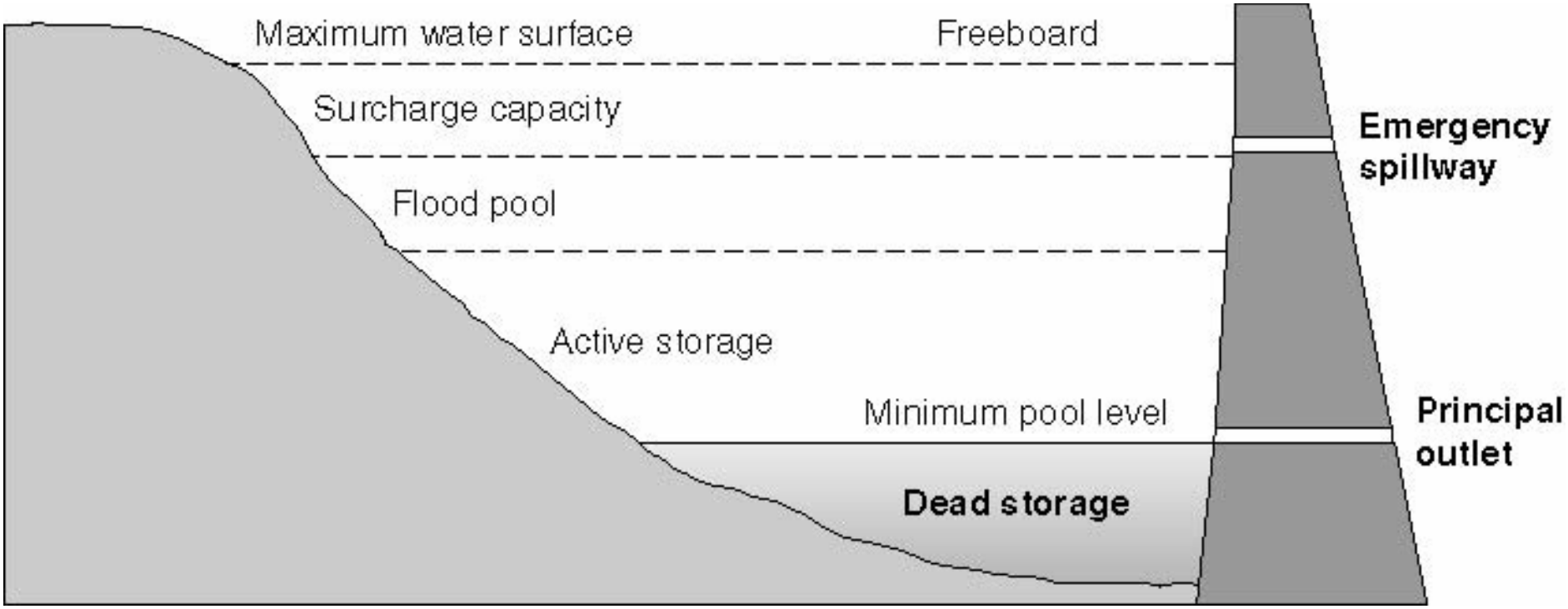
Primary Purpose	% of Total	Number of Dams
Recreation	33.8	26,152
Flood control	15.6	12,088
Fire and farm ponds	13.7	10,589
Irrigation	9.5	7,392
Water supply	9.4	7,297
Other	8.1	6,279
Undetermined	3.5	2,647
Hydroelectric	2.9	2,280
Fish and wildlife	1.4	1,046
Mining (tailings)	1.3	991
Debris control	0.5	396
Navigation	0.3	250
Total	100%	77,407

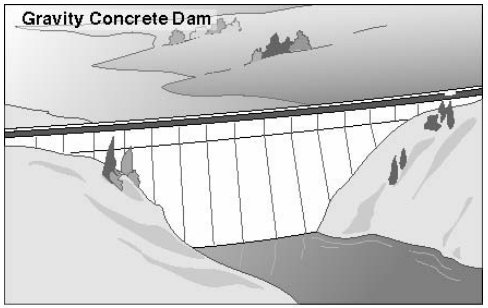
Source: U.S. National Inventory of Dams, U.S. Army Corps of Engineers, January 2001.

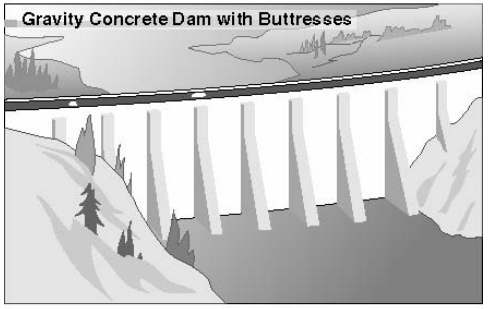
PRINCIPAL PARTS OF A DAM

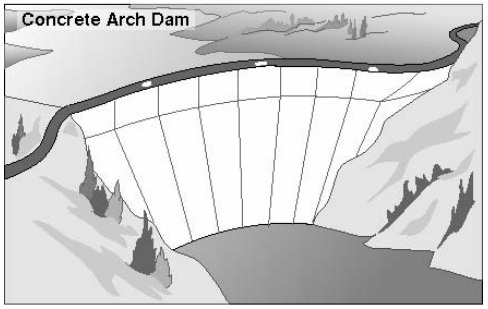


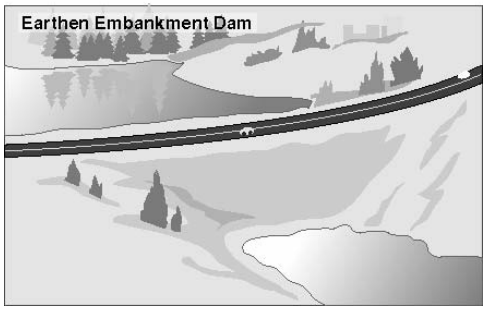
CLASSIFICATION OF PRINCIPAL STORAGE ZONES IN A CROSS SECTION OF A MULTI-PURPOSE RESERVOUR



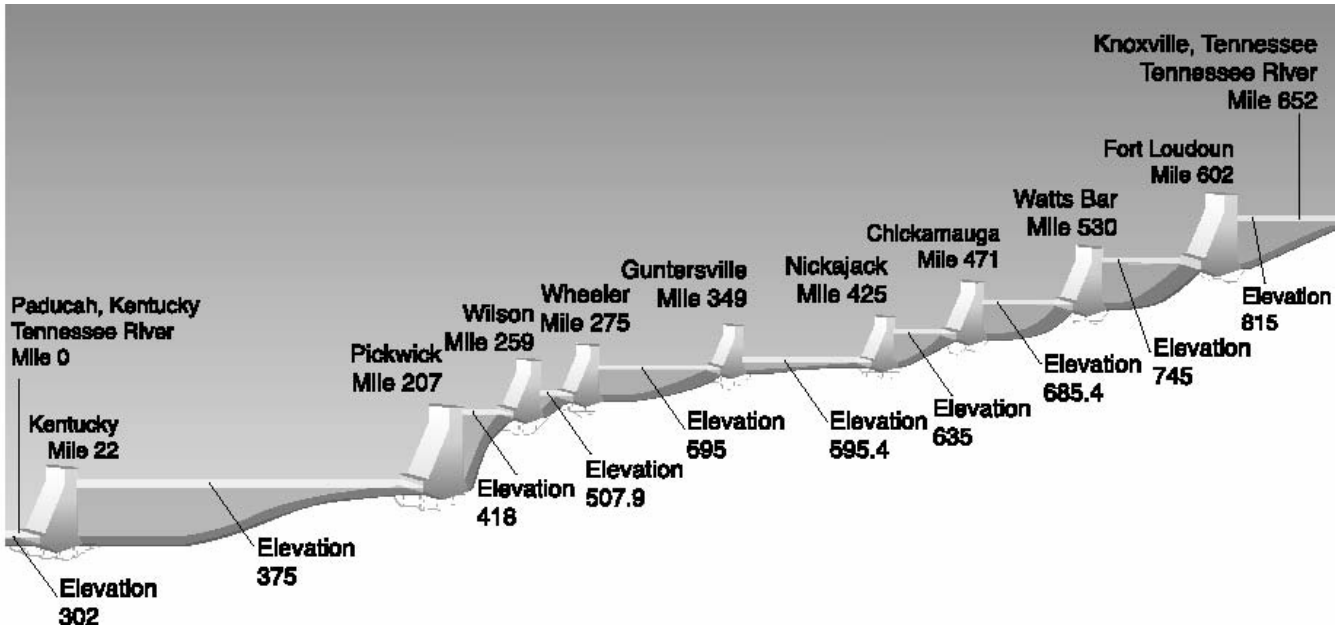




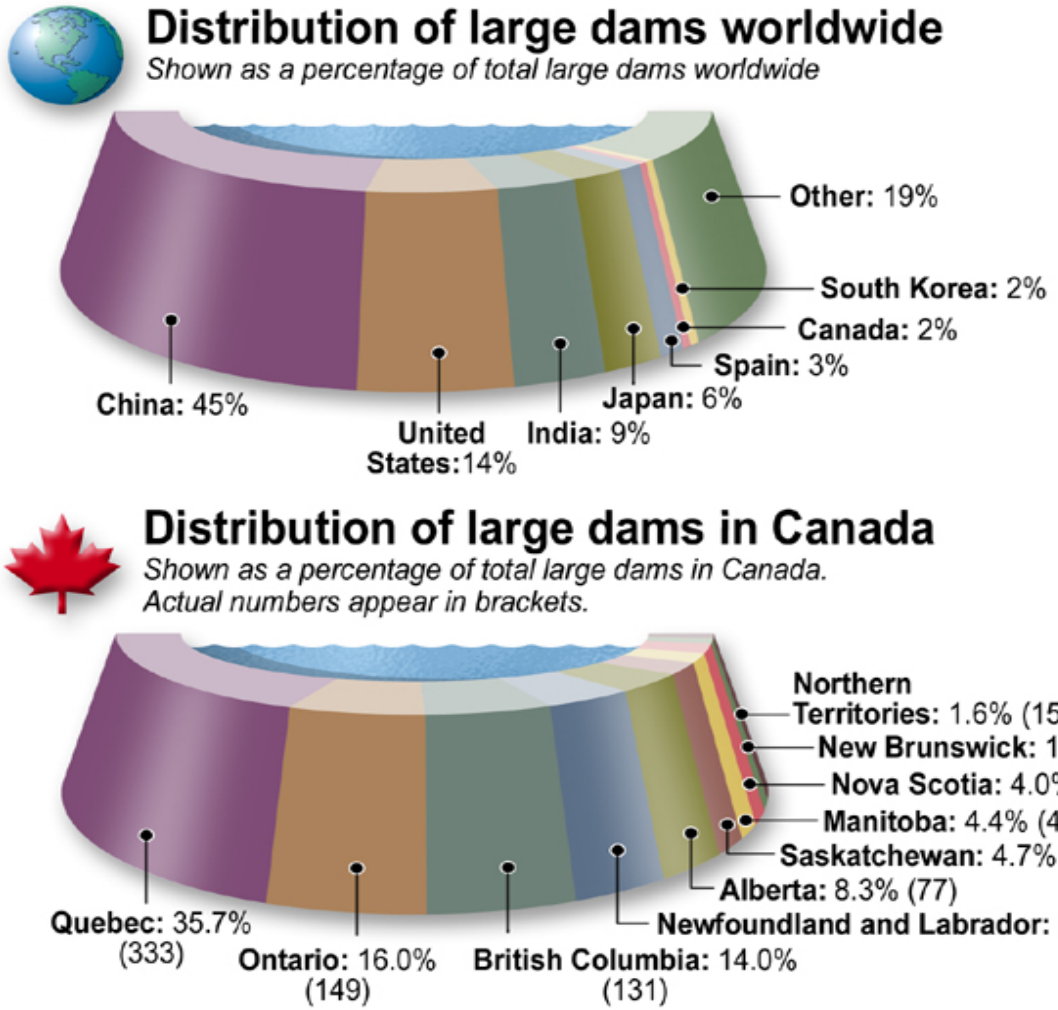




River dams (locks, levees) form a staircase of reservoirs that stretch the entire length of the Tennessee River



Dam builders have been busy beavers



In 2000 there were over 45,000 “large dams” world wide.

Half of the world’s existing large dams are built strictly for irrigation, while the remainder are build for hydro generation, water supply and flood control.

Powering the world with water

In 2000, one-third of the world's countries relied on hydropower for more than half their electricity supply and large dams generated 19% of electricity overall. About 70% of hydroelectric power generation potential has already been tapped in the developed world; only about 10% in the developing world.

The world's largest hydroelectric plants

Numbers indicate megawatts of installed generating capacity

1. Three Gorges	China	**18 200 MW**
2. Itaipu	Brazil/Paraguay	**12 600**
3. Grand Coulee	United States	**10 100**
4. Guri	Venezuela	**10 100**
5. Tucuruii	Brazil	**7 500**
6. Sayano-Shushensk	Russia	**6 400**
7. Krasnoyarsk	Russia	**6 100**
8. Corpus-Posadas	Argentina/Paraguay	**6 000**
9. La Grande 2	Canada	**5 300***
10. Churchill Falls	Canada	**5 200**

** The combined output of all eight dams at James Bay is 15 237 MW*

How much electricity is that?

La Grande 2 on James Bay, Canada's largest hydroelectric plant, produces enough hydro to constantly light a 60-watt light bulb for more than 10 000 years.**

*** Assuming the plant is run at maximum capacity around the clock.*

Ratio of the present value of project benefits to the present value of the costs

- Benefits and costs assigned a dollar value (yr accrued)
- Develop a ratio (i.e. 2:1)
- Ratio better than 1:1 means positive ratio

Determine the present value of the following costs of dam construction.

Consider Year 1 as the present year.

All values are in the thousands, and the interest is 8% simple interest compounded annually.

Year 1	Year 2	Year 3	TOTAL
$100,000	$150,000	$200,000	$450,000

The present value cost of Year 1 = $100,000

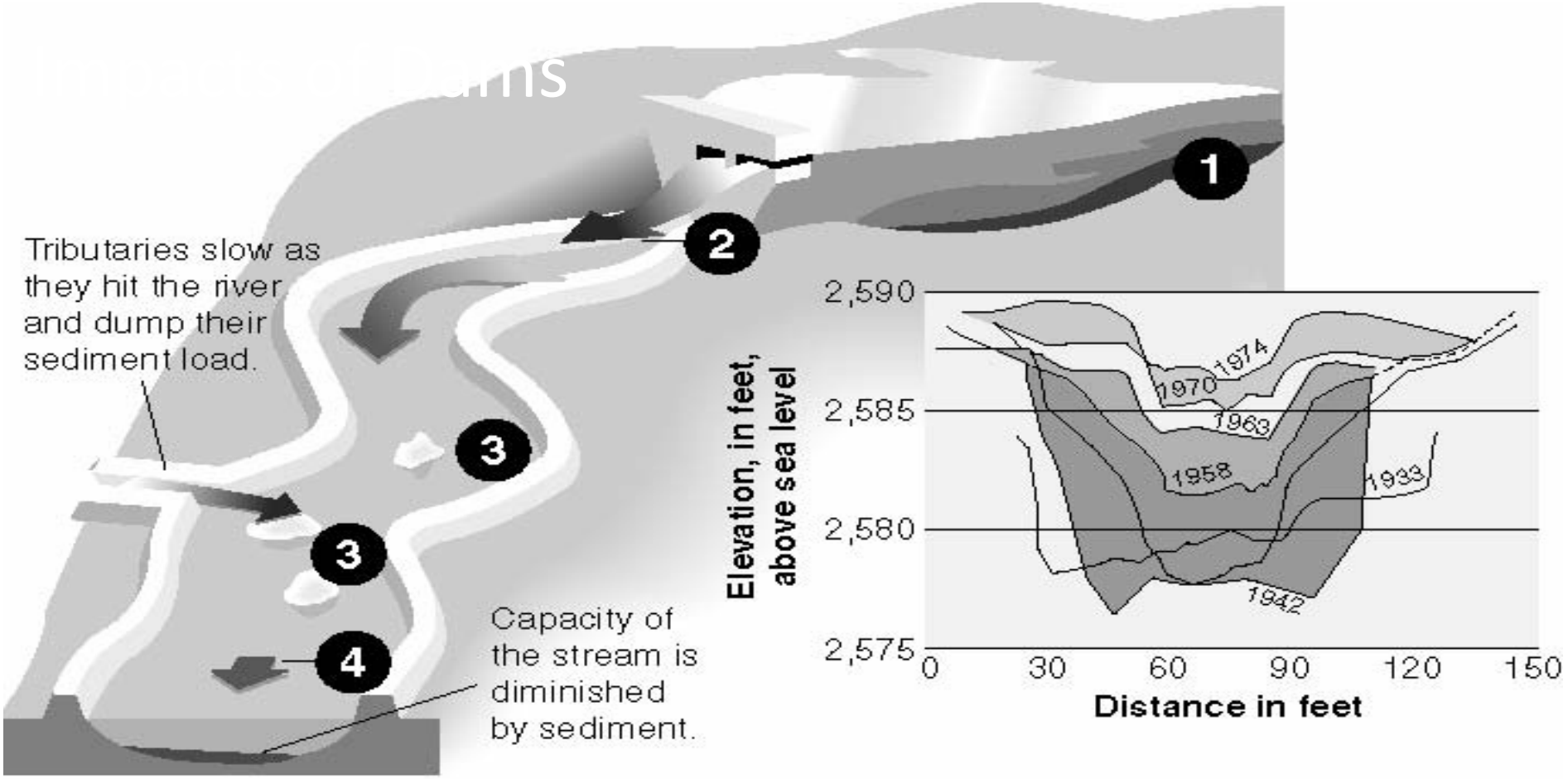
The present value cost of Year 2 = $150,000 divided by 1.08% = $138,889 ($138 889 invested 8% simple interest for one year = $150 000)

The present cost of Year 3 = $200,000 divided twice by 1.08% = $ 171,468 (This means that $171,468 invested at 8% simple interest will be worth $200 000 after two years)

Therefore, the present value cost of $450,000 in this example is $410,357

$100,000 + $138,889 +$171,468 = $410 357

Impacts of Dams



- Dams change behaviour of rivers- sediment load settles behind a dam.
- Downstream, water released through outlet pipes causes channel erosion.
- Farther downstream, the opposite can occur with silt forming islands and sandbars.