

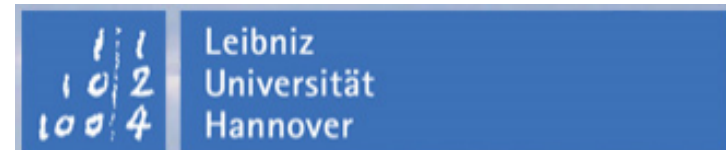
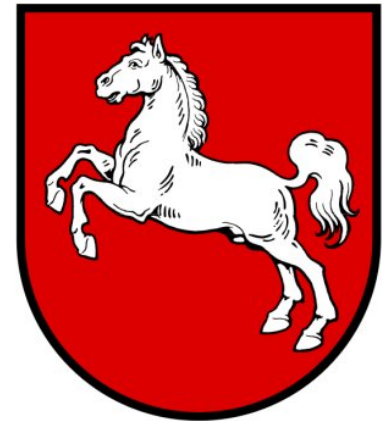
# "Professional Education - a key to Sustainable Development"



Public Lecture by  
**Gottfried Konecny**

**Emeritus Prof.**

**Leibniz University  
Hannover, Germany**



# Introduction

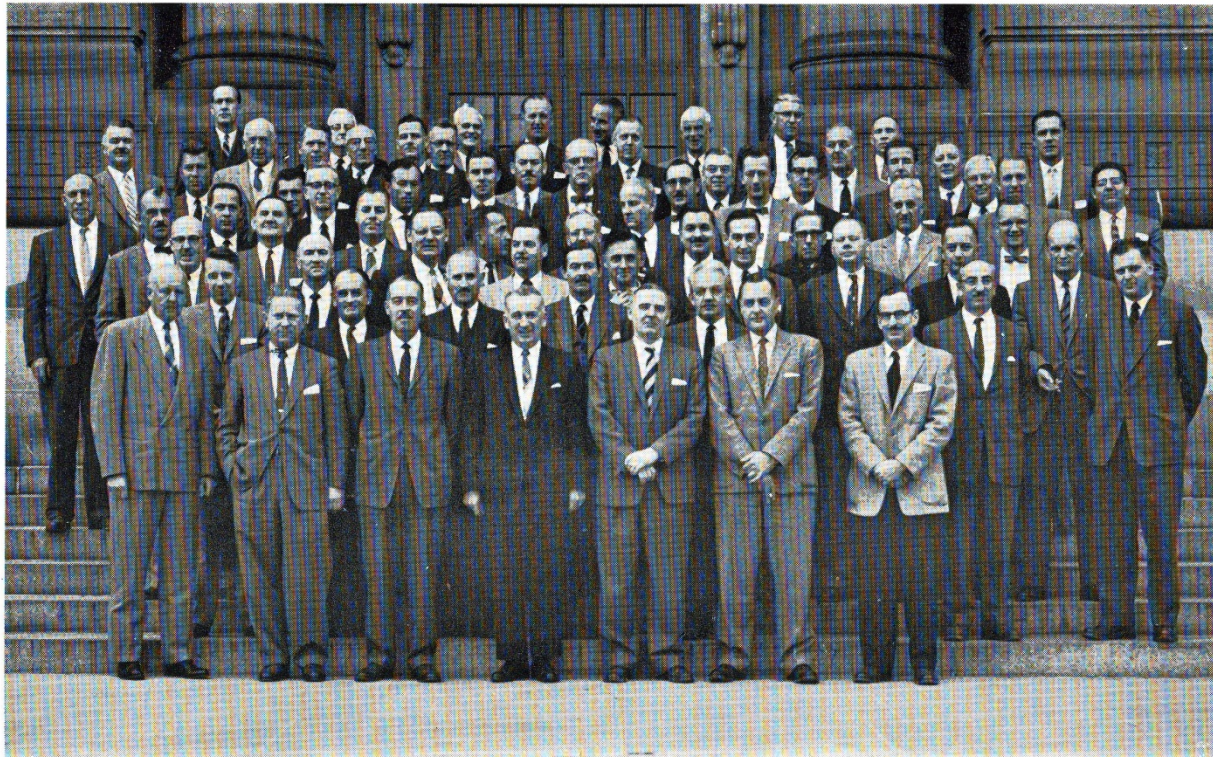
- **I have had the privilege to work at UNB from 1959 to 1971 under President Colin B. Mackay and under Dean Jim Dineen at a time, when the Department of Surveying Engineering was established.**
- **Following with the rapid development of the discipline the name of the Department is now Geodesy and Geomatics. I am impressed what became out of the Department after 1971.**
- **UNB has formed my life, and I am grateful to have the opportunity to express this in public today.**

# **Why was the Program for Geodesy and Geomatics established 50 years ago?**

- **It constituted a separate professional discipline.**
- **This discipline satisfied the need to solve problems of a growing and highly developing a modern country**
- **The discipline is uniquely suited to tackle the problems of what today is called „sustainable development“**
- **professionals of this discipline are, like all engineers, problem solvers not problem creators**
- **it is satisfying to know, that they still do it today**

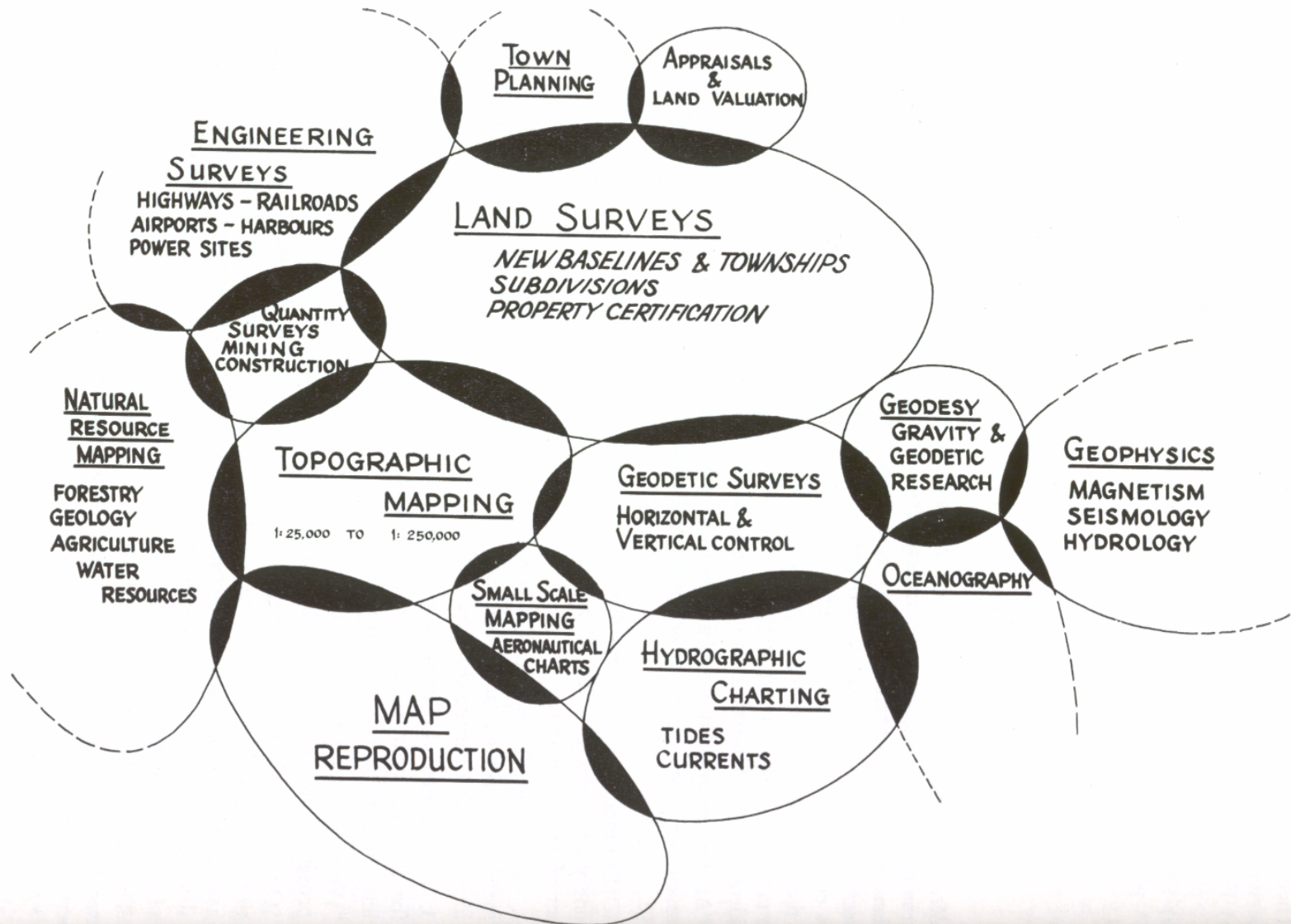
## It began in 1960 at UNB

- **4 UNB staff members of UNB had returned from a Canadian Symposium on Survey Education in the fall of 1959 in Ottawa . Ira Beattie, Willis Roberts Bill Hilborn and me convinced the President and the Dean, that a program to make Canadian Surveying professional, was a good idea for UNB.**

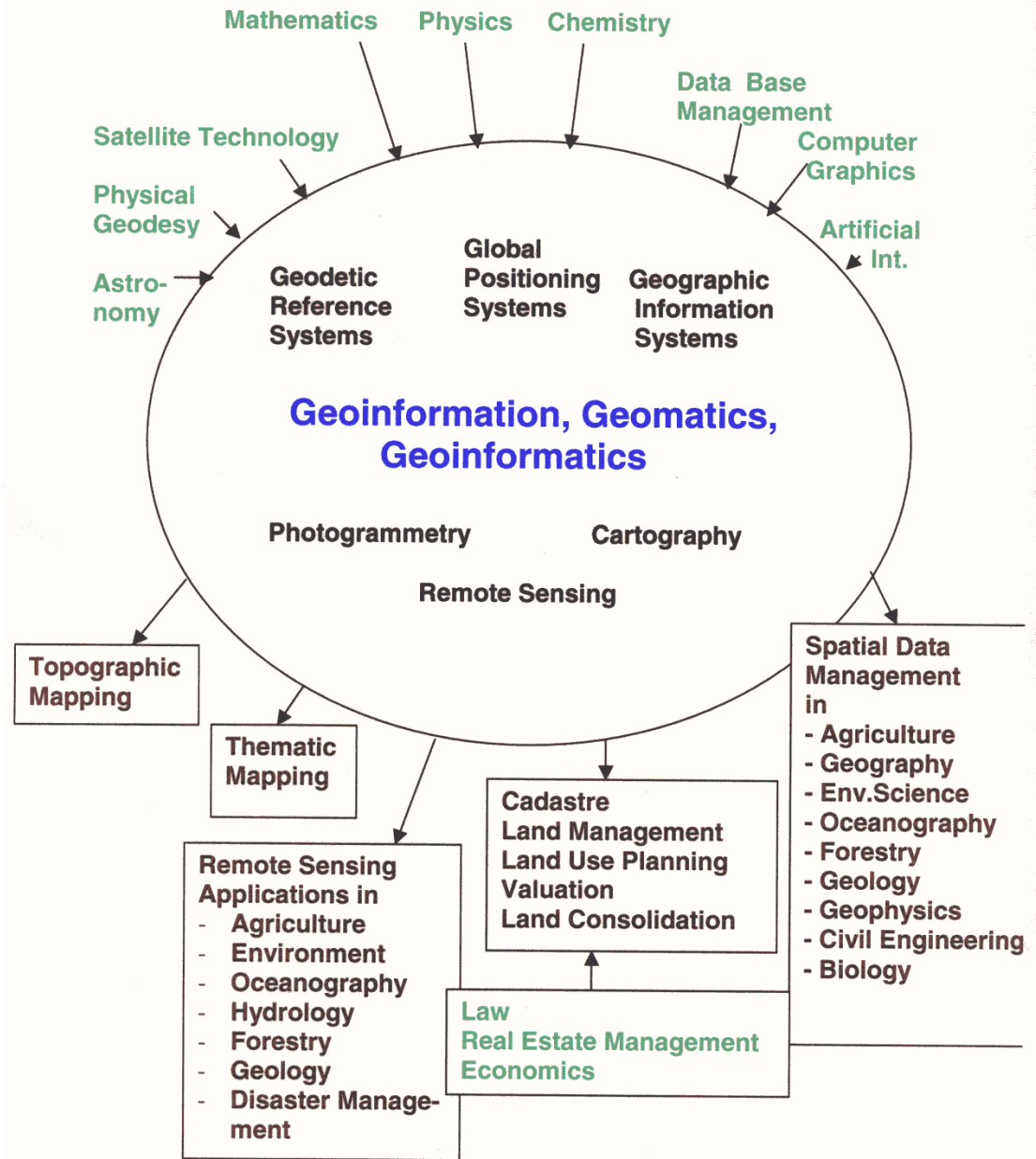


# The Scope of the Survey Profession in 1959

was defined by Angus Hamilton in his keynote paper at the Conference:



**Today  
Geomatics  
can be similarly  
defined**



# Where should Professional Courses be taught?

## Some History: First Universities in Europe and its spinoffs:

The Universities were created as reaction to church oriented schools (monasteries)

- scientific knowledge free of reglementation
- community of those who teach and learn
- freedom of teaching (lectiones, disputationes)
- academic honours (bacchalaureus, magister, doctor)
- freedom from taxes
- disciplines: theology, law, medicine, liberal arts

First Universities were:

Bologna 1088

Paris 1150

Oxford 1167

Cambridge 1209

Salamanca 1218

Montpellier 1220

Padua 1222

Prague 1348

Vienna 1365

UNAM Mexico 1551

Harvard 1636

UNB 1785

# After French Revolution:

**reaction to political pressures; liberalism**

**Wilhelm von Humboldt** (Berlin 1809, Prussian Civil Servant)

- unity between teaching and research
- development of personality by scientific argument
- rejection of thought, that University prepares for a career

**Career development started in trade schools or Ecole Polytechniques (often for military purposes)**

**First Engineering Schools:** preparation for a career

**MIIGAIK Moscow 1779**

**Paris 1794**

**Berlin 1821**

**Karlsruhe 1825**

**Munich 1827**

**Hannover 1831**

**Univ. of London 1836**

**MIT, Cambridge, Mass. 1861**

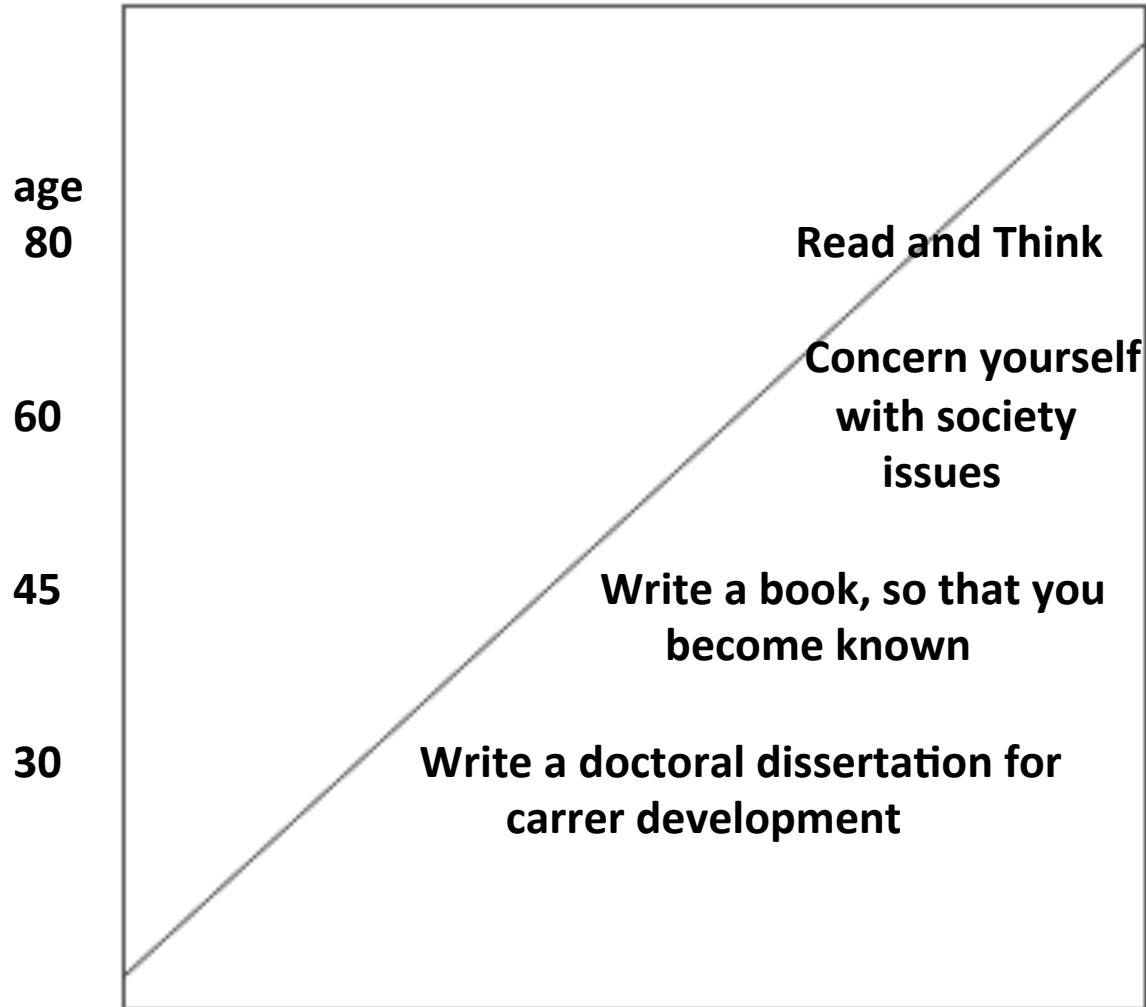
at UNB first Civil Engineering Course  
(mostly Surveying) 1854



# Problems in Geomatics Education?

- overcapacity of educational facilities in Europe
- undercapacity of educational facilities in the developing countries
- estimated need for graduates per year  
=  $0.000\ 002 \times \text{population}$ :
  - e.g. Canada = 50
  - e.g. Germany = 160
  - e.g. USA = 500
  - e.g. China = 2000

# Lifetime Cycle



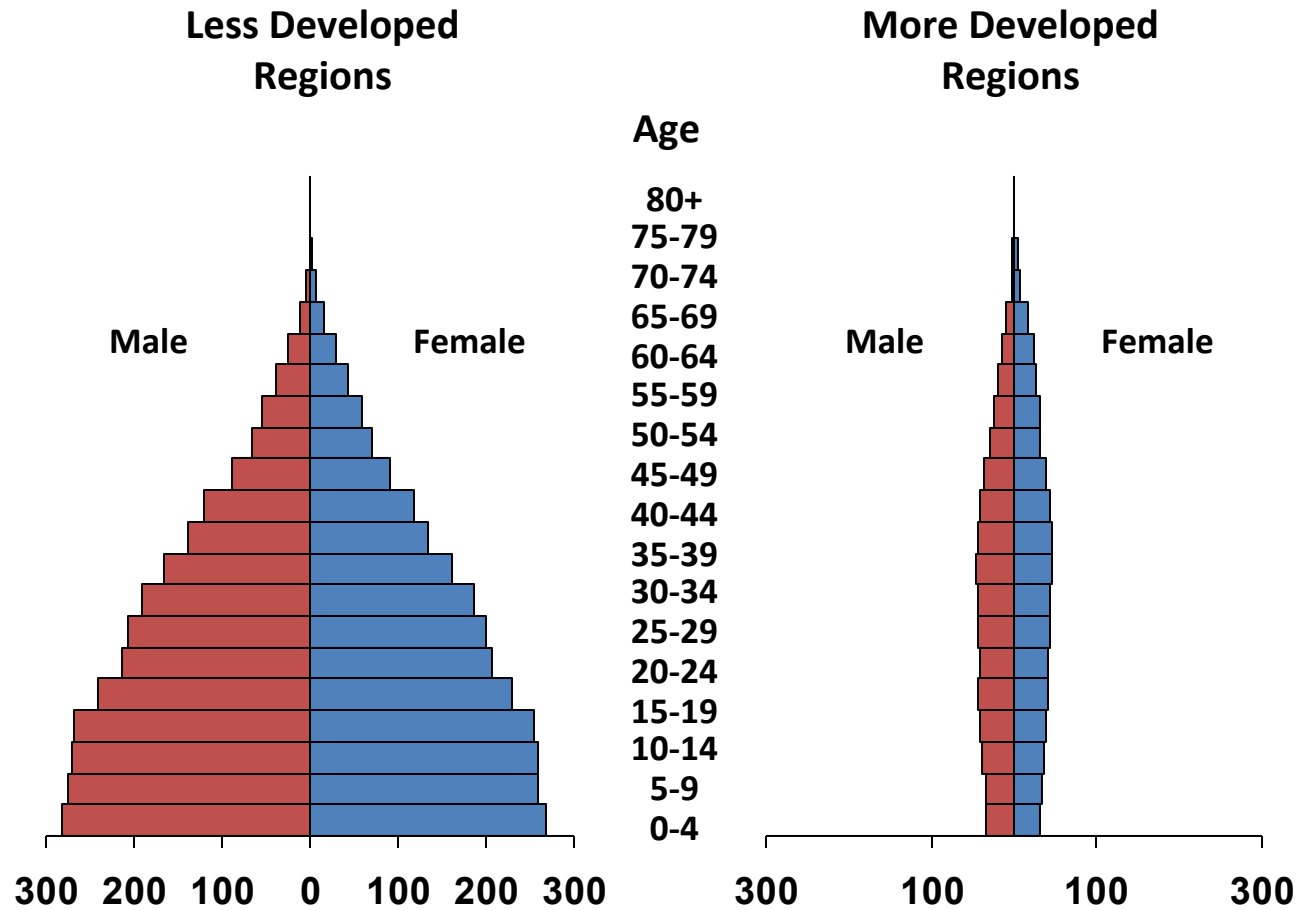
## Theme 1: Land Governance for the 21<sup>st</sup> Century Challenges

- Today's world population of 6.8 billion continues to grow to an estimated 9 billion by 2040.
- Food security has become a key global challenge.
- Increasing number of large scale, international land acquisitions.
- To not only control and manage the effective use of physical space, but to also be holistic to ensure sound economic and social outcomes.

# Age Distribution of the World's Population

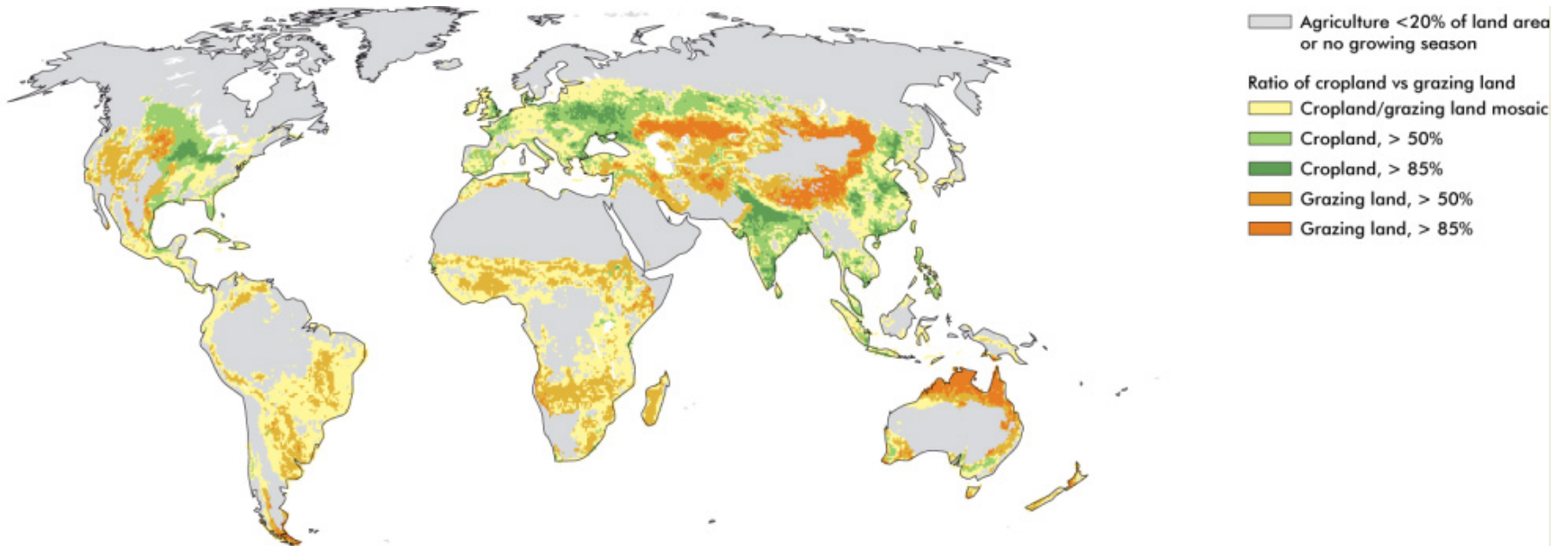
Population Structures by Age and Sex, 2005

Millions

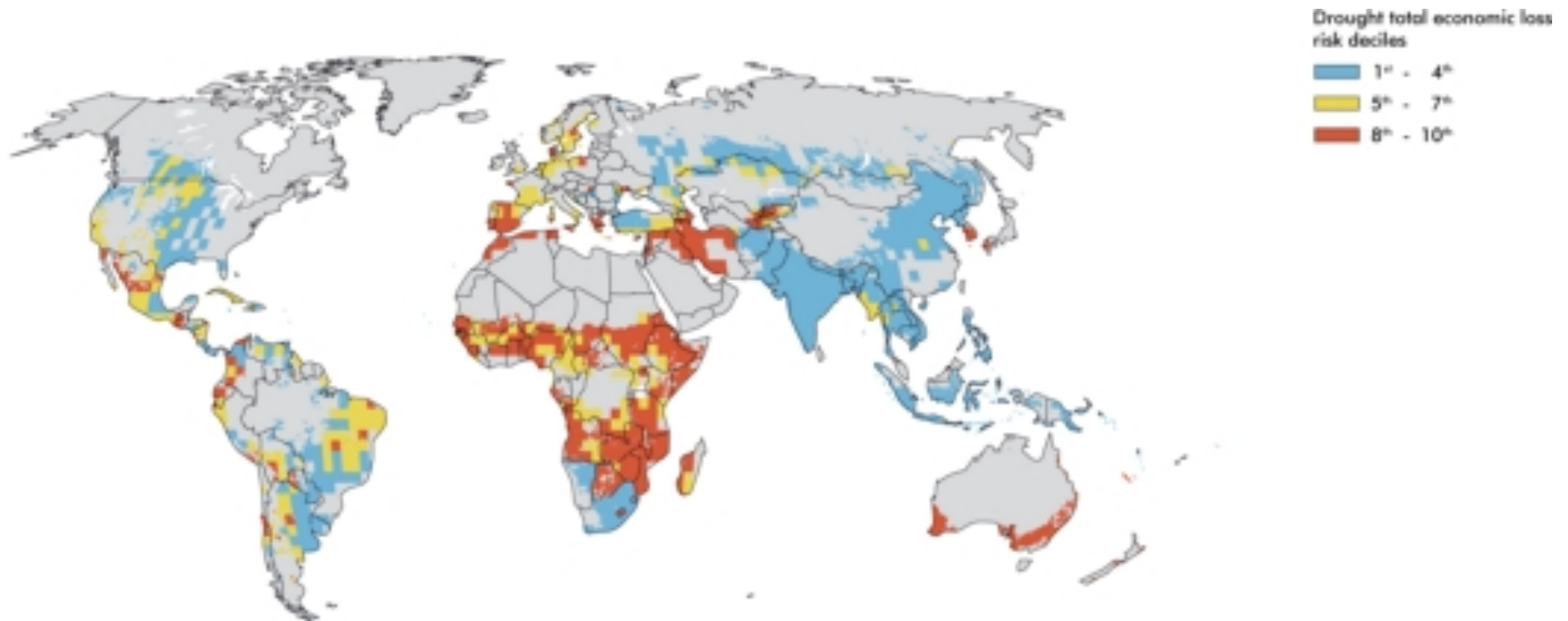


Source: United Nations, *World Population Prospects: The 2004 Revision*, 2005.

# Cropland and Pastures



# Drought Risk

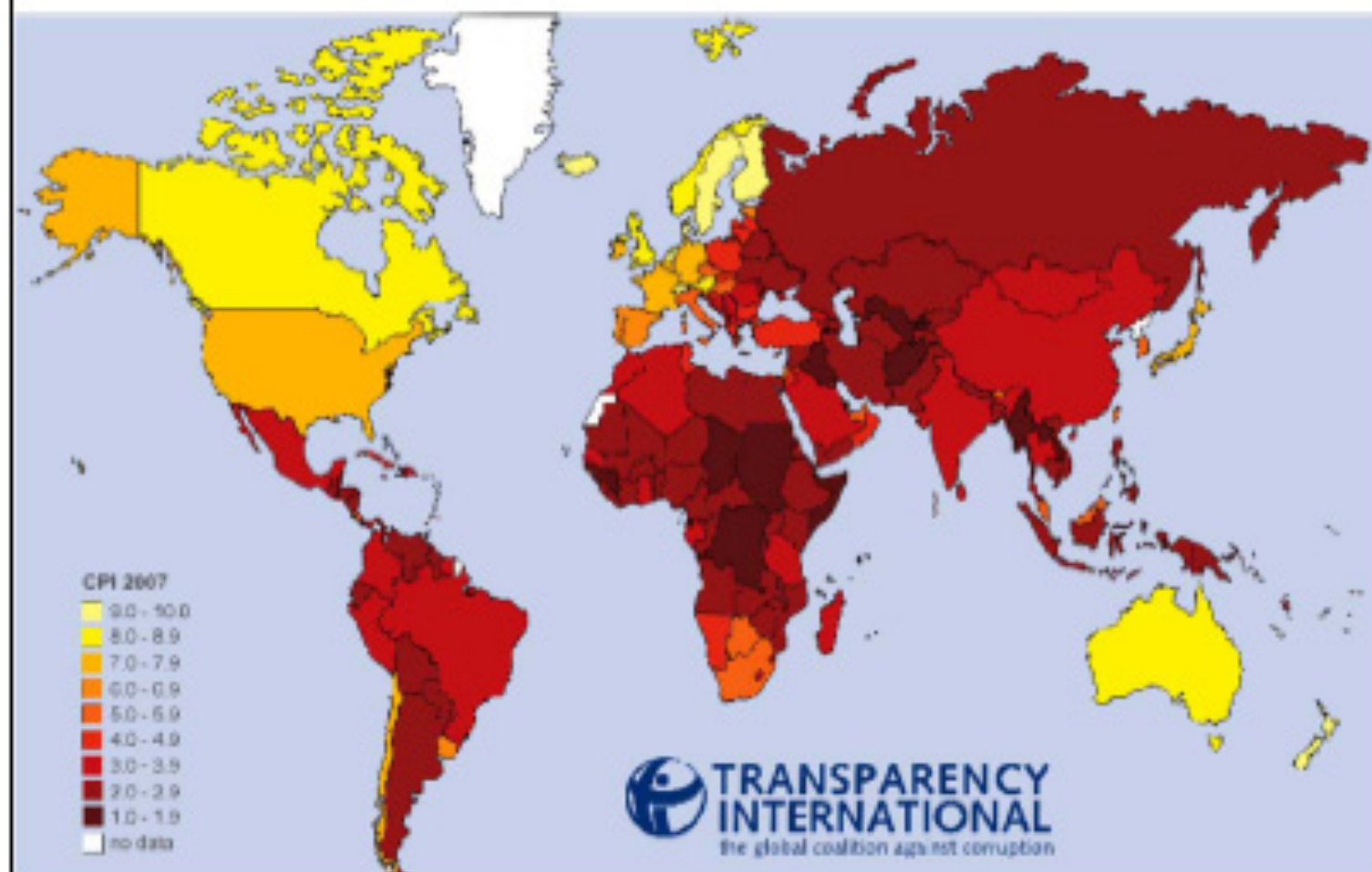


## Theme 2: Building sustainable and well governed land administration systems [LAS]

### Challenges

- To ensure that LAS are providing the infrastructure for implementing land policies and land management strategies in support of sustainable development.
- LAS must evolve and must be aligned with the current needs of a country through the requirements defined in a land policy framework.
- To be inclusive and allow the participation of the poor.

## Good governance and corruption





## Theme 3: Securing Social Tenure for the Poorest

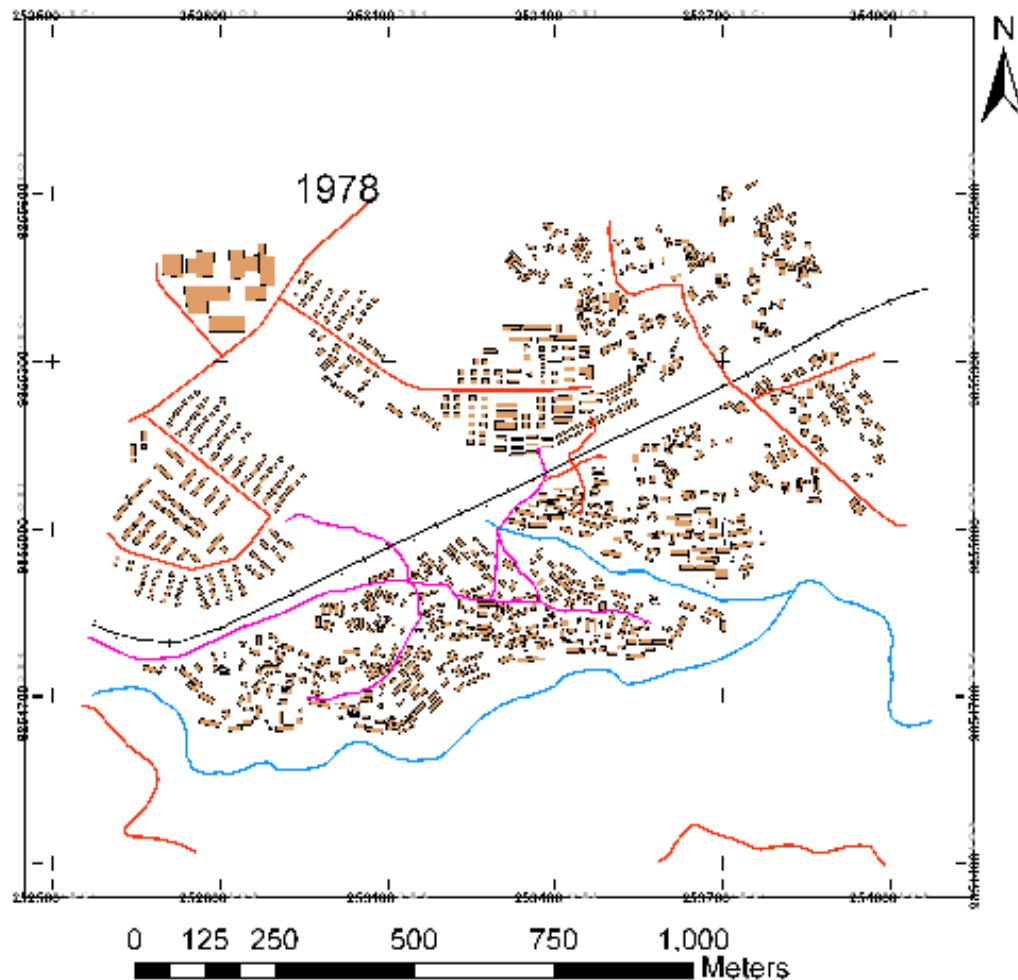
### Challenges

- Today there are many rural poor and around 1 billion slum dwellers world-wide that will rise to 1.4 billion by 2020, if no remedial action is taken.
- Most of the urban poor do not have secure tenure within these large informal settlements.
- Conventional cadastral and land registration systems cannot supply security of tenure to the vast majority of the low income groups.
- Many communities across the world have land rights under communal or customary systems that are often not secure in law.



**Kibera, Nairobi, 250 ha, 1 mill+ people**

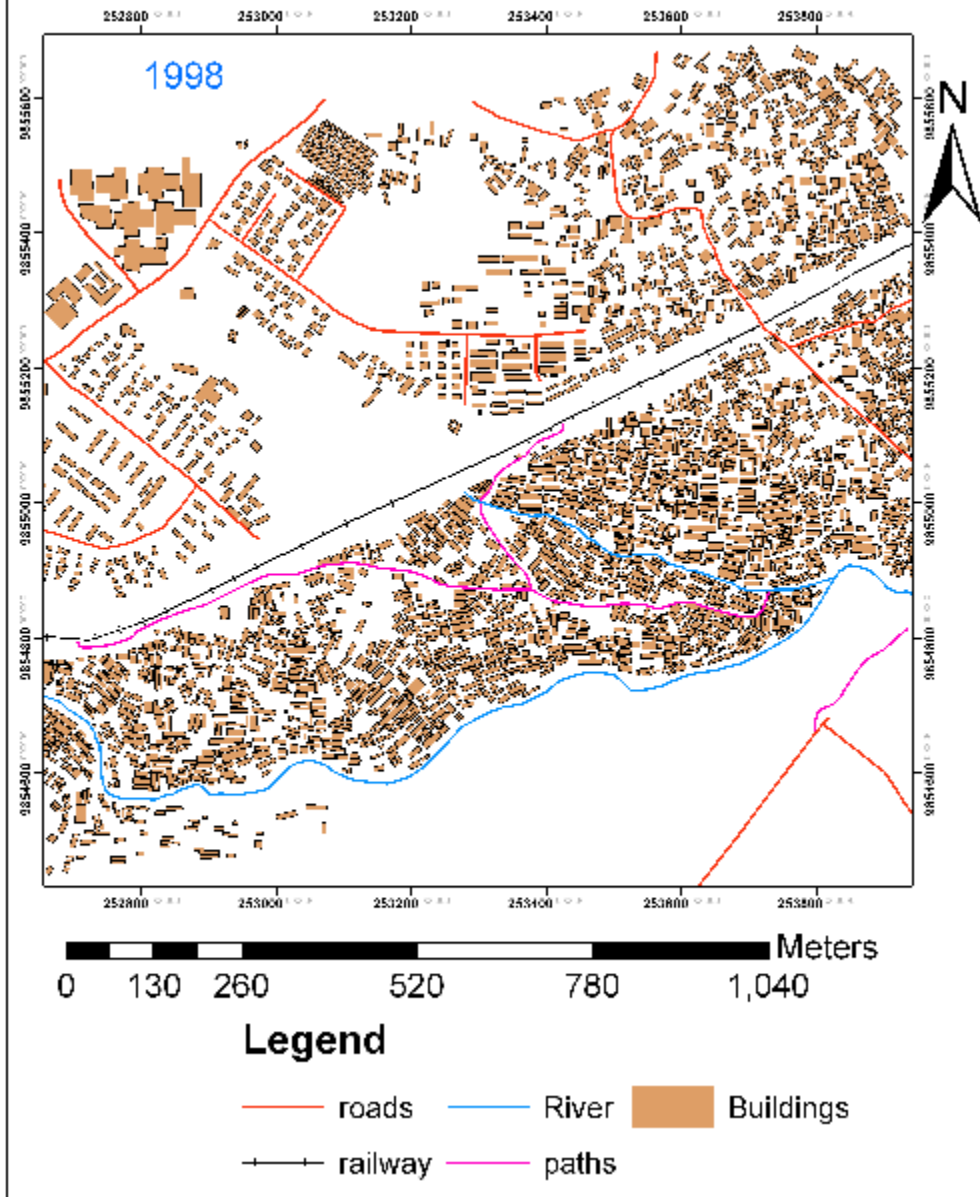
# Land Use Land Cover Map of Kibera 1978



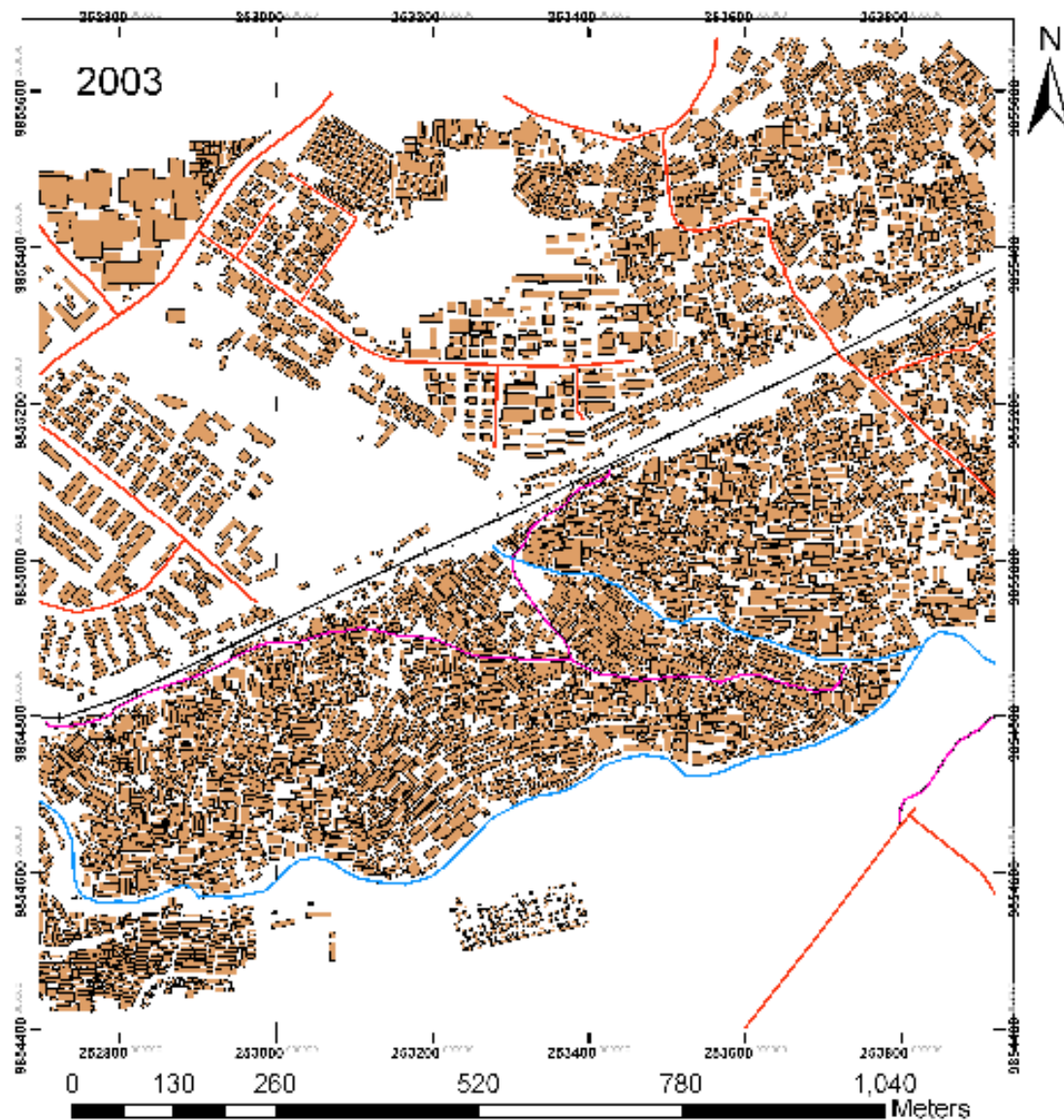
## Legend

- Roads78
- river78
- rail78
- paths78
- buildings78

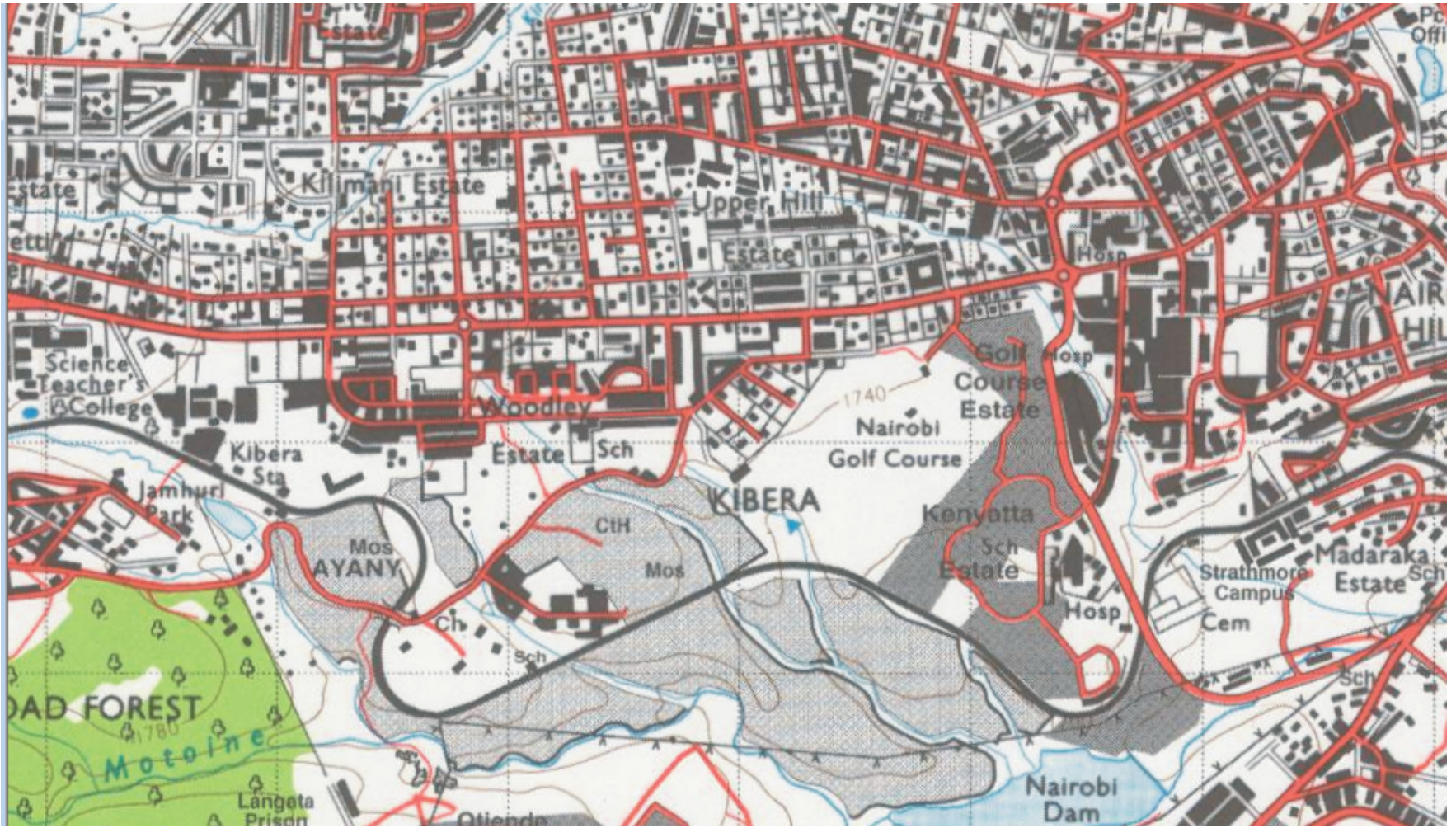
# Land Use Land Cover Map of Kibera 1998



# Land use Land Cover Map of Kibera for 2003





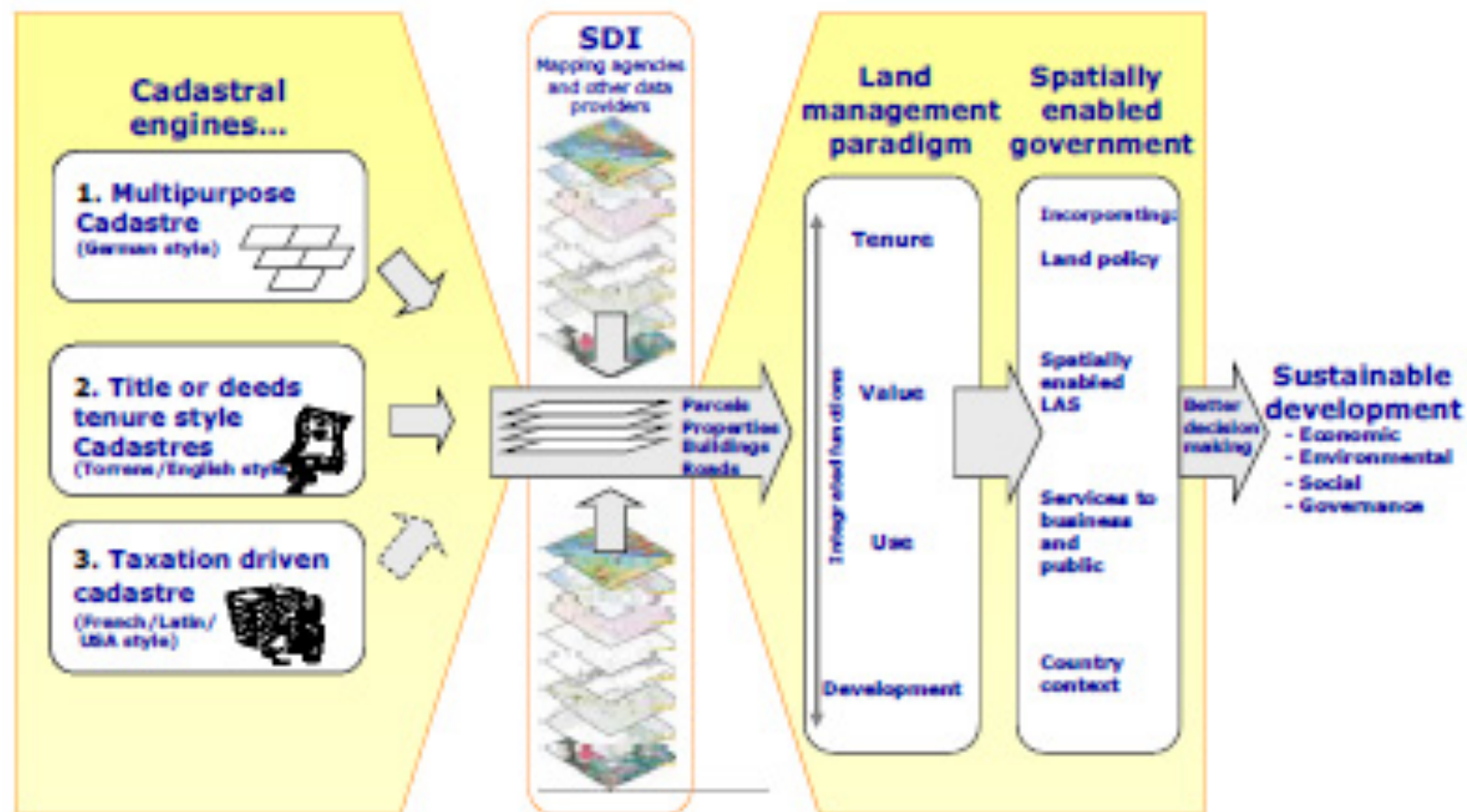


## Theme 4: Making Land Markets Work for All Challenges

- In many countries certain land rights are not a tradable commodity, such as customary land rights.
- Land markets can still be far from perfect since access to that sales market may be restricted by financial, corruption, social or informational reasons.
- The resulting restrictions mostly disadvantage the poor, while being at the advantage of the powerful elites.
- Inappropriate loans being provided to high risk groups can lead to foreclosures and distress sales, leaving poor people landless.



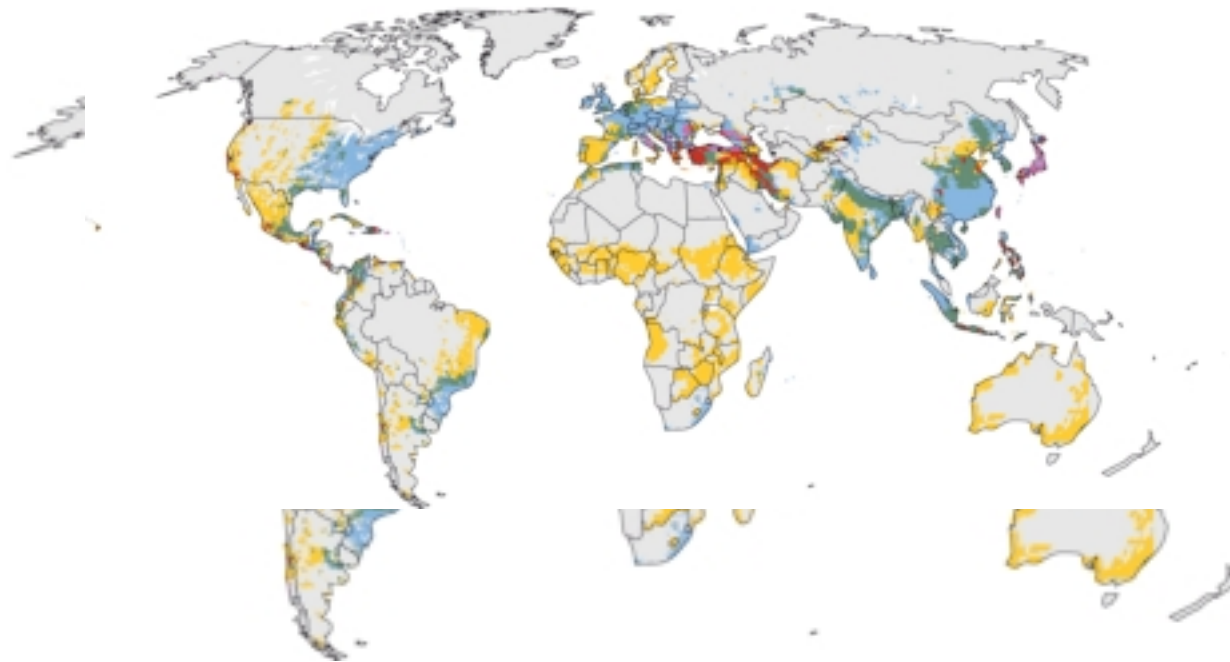
# Significance of the Cadastre



## Theme 5: Improving Access to Land and Shelter Challenges

- Without a range of appropriate interventions being applied within the broader context of economic growth and poverty reduction policies, social exclusion and poverty will continue to spiral out of control.
- Land markets, are not a magical solution for addressing structural inequalities.
- Every year a significant number of people are forced to migrate from their homes due to conflict situations, evictions or natural disasters.
- Only 2% of registered land rights in the developing world are currently held by women.

# High Disaster Risk Areas

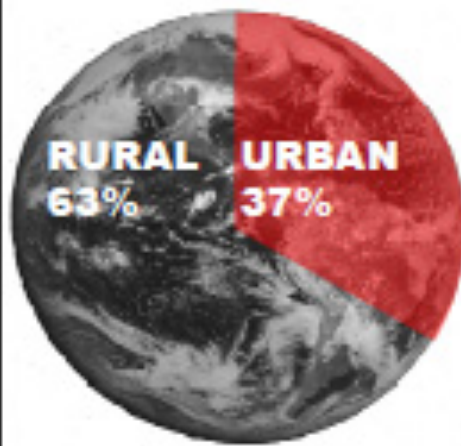


- High total economic loss risk  
top 3 deciles of risk from:
- Drought only
  - Geophysical only
  - Hydro only
  - Drought and hydro
  - Geophysical and hydro
  - Drought and Geophysical
  - Drought, Hydro and Geophysical
- economic loss risk  
if risk from:
- hydro only
  - geophysical only
  - hydro and geophysical
  - hydro and geophysical
  - hydro and geophysical
  - hydro and geophysical
  - hydro and geophysical

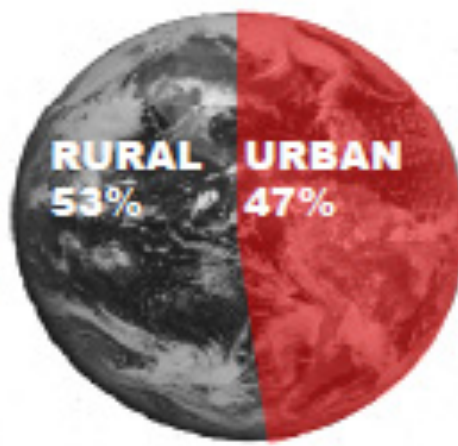
## Theme 6: Land Governance for Rapid Urbanisation Challenges

- The urban global tipping point was reached in 2007 when over half of the world's population was living in urban areas; around 3.3 billion people.
- This incredibly rapid growth of megacities causes severe ecological, economical and social problems. It is increasingly difficult to manage this growth in a sustainable way.
- Urbanisation is also having a very significant impact on climate change.
- Rapid urbanisation is setting the greatest test for Land Professionals in the application of land governance to support and achieve the MDGs.

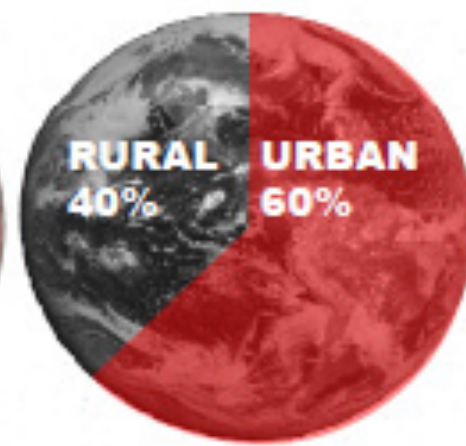
## Urban population growth



**1970**



**2000**



**2030**

2007:

Total world population :	6.5 billion
Total urban population:	3.3 billion
Total slum dwellers:	1.1 billion

## Urban Challenges

- 50% humanity lives in cities
- By 2050 developing world urban pop. 5.3 billion
- 90% of urban growth is slum growth in Asia
- One third urban population in developing countries lives in slums



- **Urban footprint increasing faster than population**
- **By 2030 cities will increase footprint by 175%**
- **By 2030 3 billion more people will need serviced land & housing**



**UN HABITAT**  
FOR A BETTER URBAN FUTURE

## Fresh water is very expensive



Delhi (India) draws 75% of its drinking water from Yamuna river into which the city dumps quantities of sewage to join a cocktail of farm chemicals and industrial effluents, including arsenic



## Energy insecurity

Public Power Corporation in Greece will pay up to 2,2 billion euros a year for carbon emission licenses unless it shifts away from its dependence on lignite.

Consumers could expect a rise in electricity bills of 45% by 2013



Greece



Hanoi



Albania



## Waste management - garbage treatment

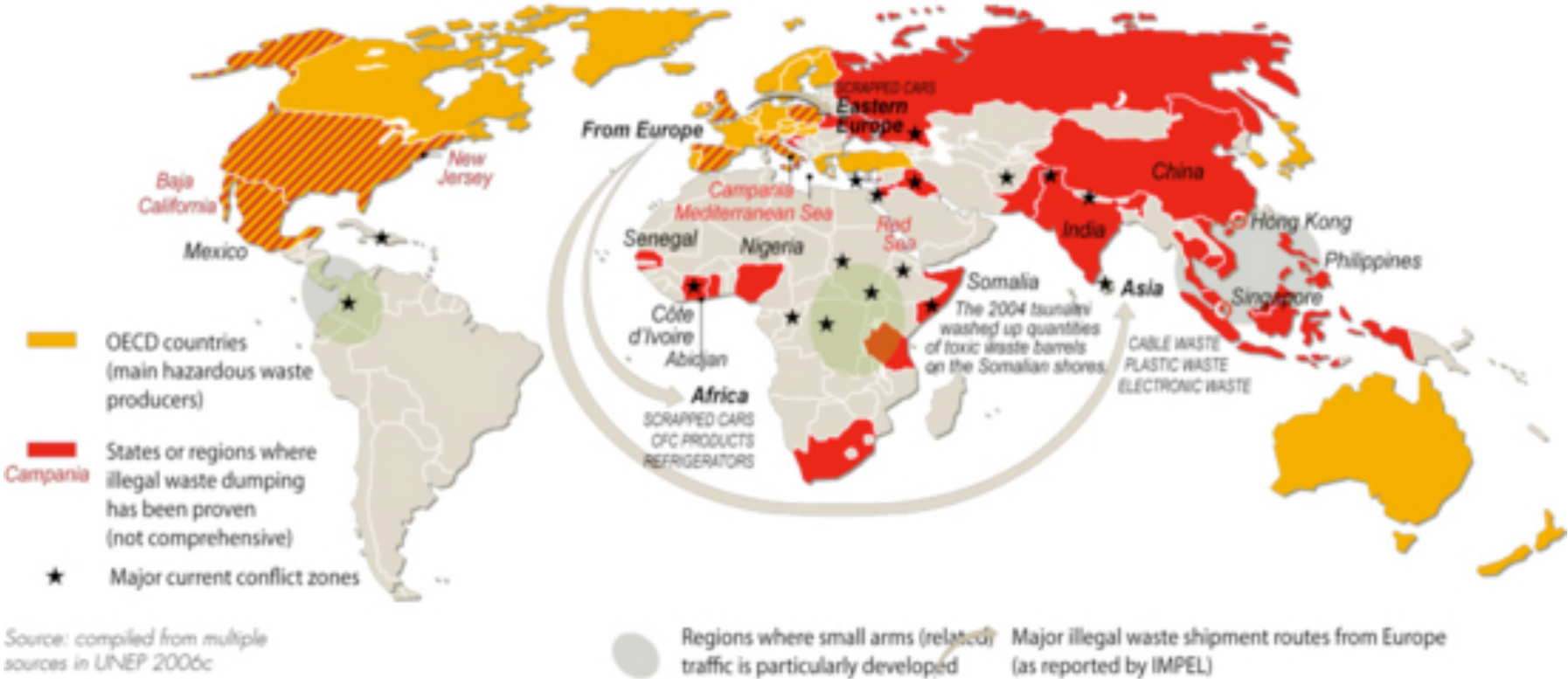
6,000 tons of trash are produced daily in this city of >4M people

Greece has successfully managed to close about 800 open landfills and avoid high EU penalties. However, the costs for the regeneration and mechanical recycling procedure are also high



# Waste Trafficking

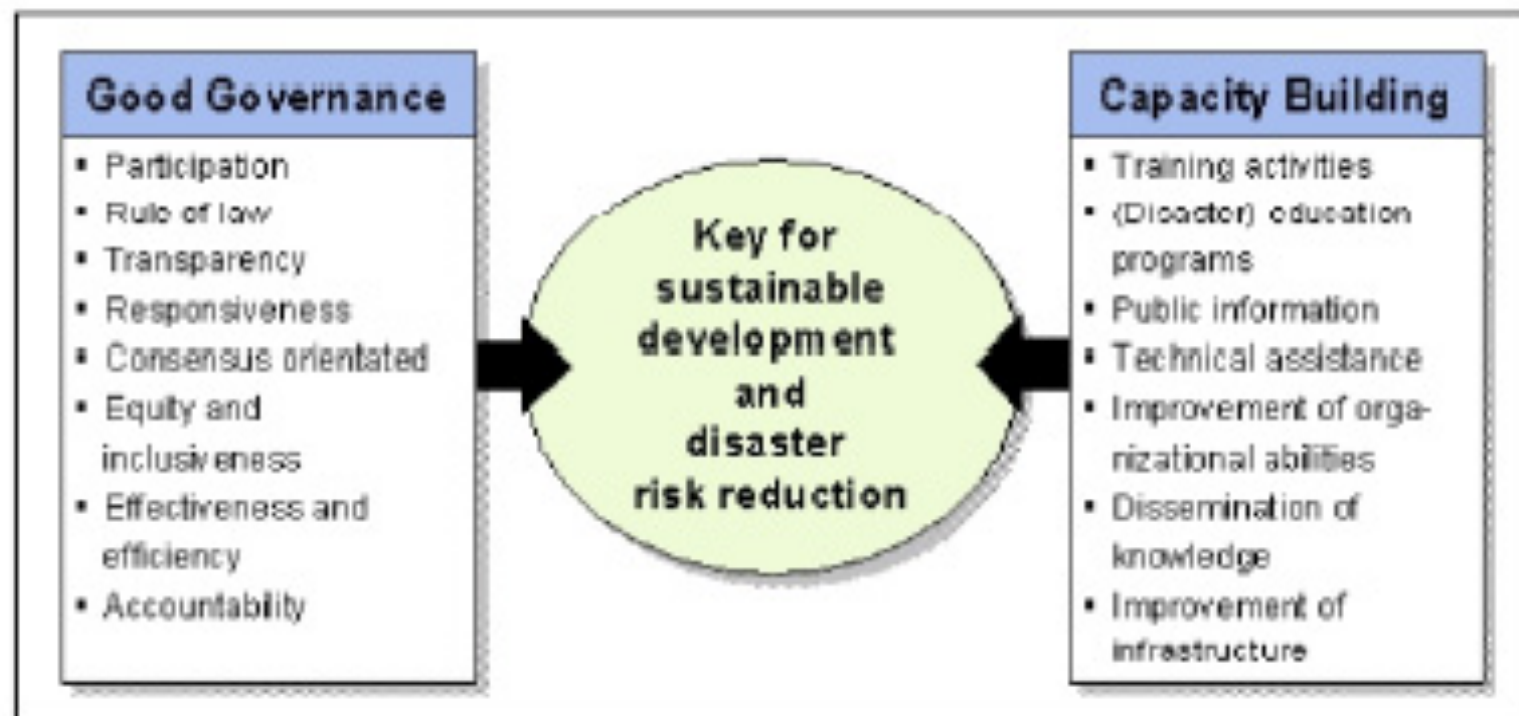
Figure 8.7 Waste trafficking



# What can our profession do about it?

1. we cannot prevent the problems arising
2. but we can collect, administer and make transparent data on the problems
3. we have to think global, but act local in our communities
4. we are custodians of a global – national – and local spatial data infrastructure
5. 80% of all decisions have a spatial component
6. we must provide, manage and disseminate timely and accurate spatial information
7. to be able to do this, we need high tech skills provided by our foundation of study combined with lifelong learning

## Building the capacity



*"While many people are aware of the terrible impact of disasters throughout the world, few realise this is a problem that we can do something about"*

*Kofi Annan, 2004*

## The impact of climate change



The interaction between climate change, ecosystem degradation and disaster risk, UNEP, 2009

# Our education provides us with the tools:

## 1. Global Positioning by satellites

### Commission 5 – global positioning infrastructures

- **Strong commission network**  
Highly successful conference programmes to enhance the commission work plan
- **Strong interaction with IAG**
- **Strong cooperation with UN-OOSA**
- **Publication**  
on Cost Effective GNSS Positioning Techniques  
Contributing to the global agenda



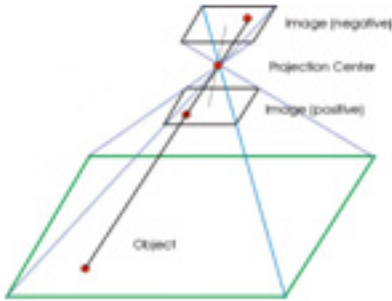
## 2. Ground Surveying with new technology

### 2 Types of Surveying Instruments

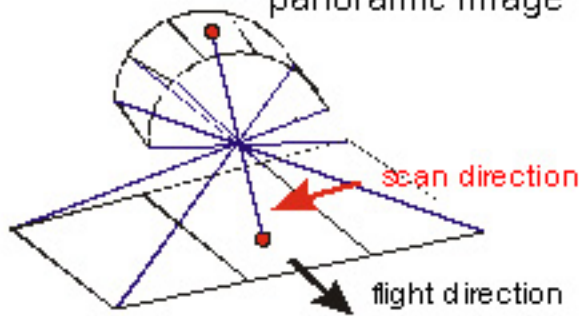


# 3. Aerial and Satellite Remote Sensing

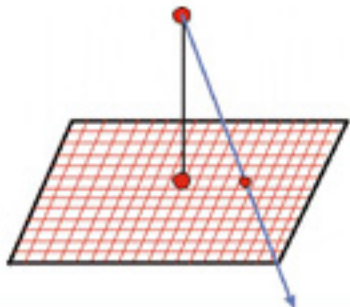
perspective photo



panoramic image

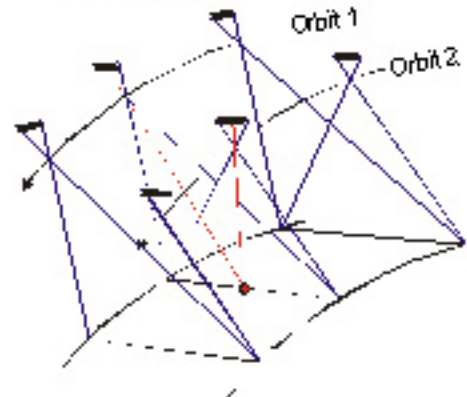
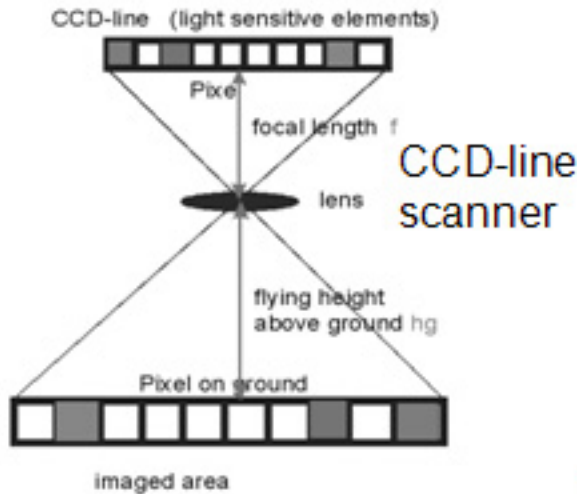


photographic material

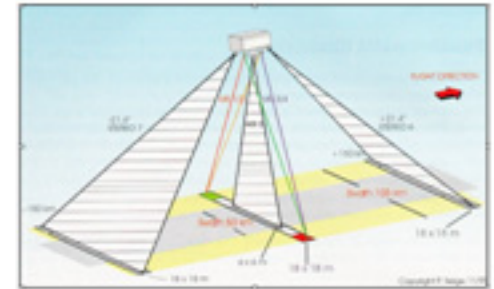


perspective digital image

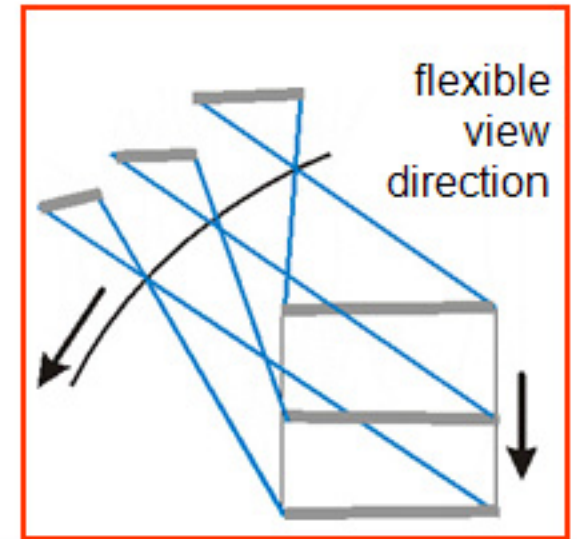
## Sensor Types



classical view to side



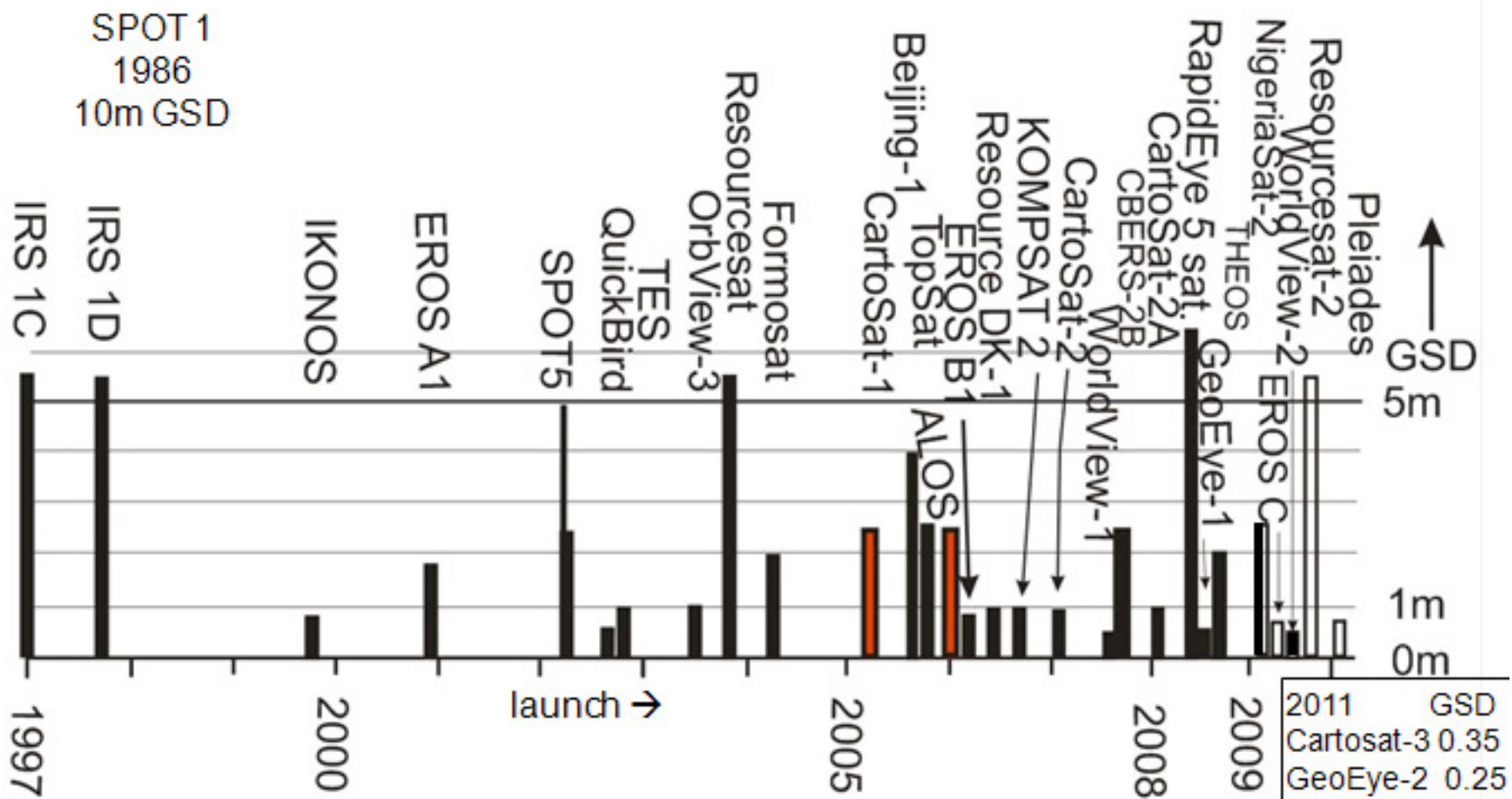
CCD-line scanner with different view directions in orbit



flexible view direction



## Very high resolution optical space images



## Test field Zonguldak



IKONOS ms



QuickBird ms



KFA1000 photo



OrbView-3

GSD:

4m

2.4m

1.6m

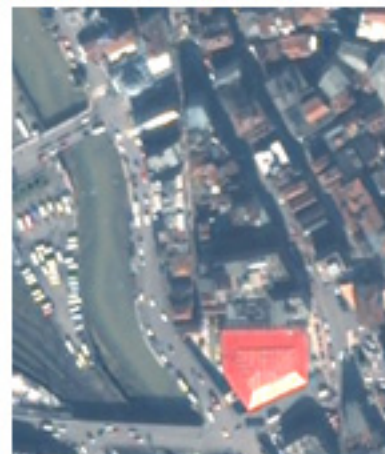
1m



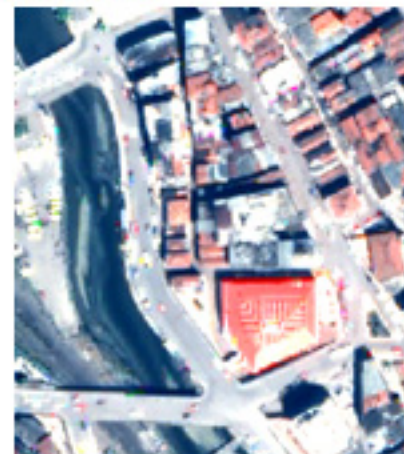
IKONOS pan 1m



QuickBird pan 0.6m

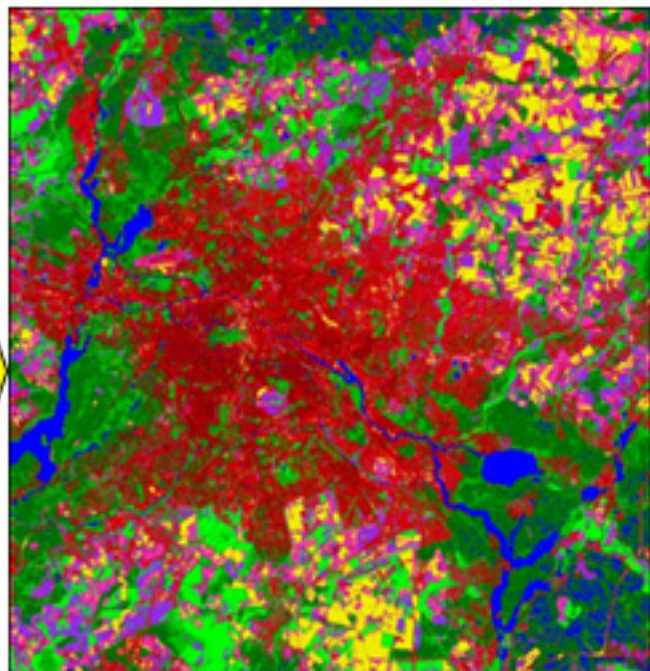
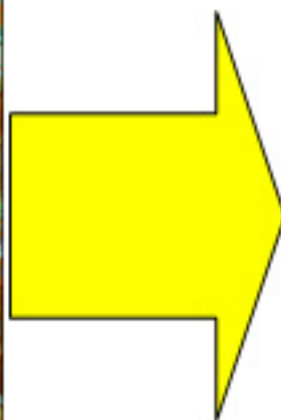
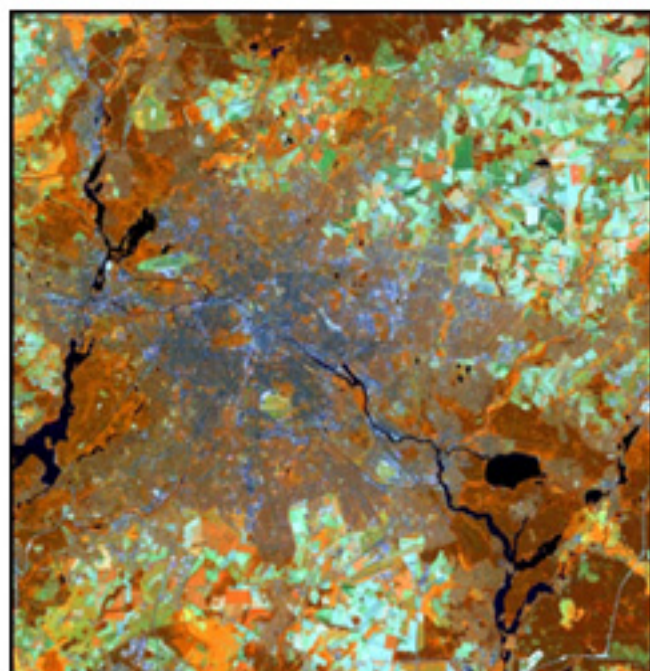


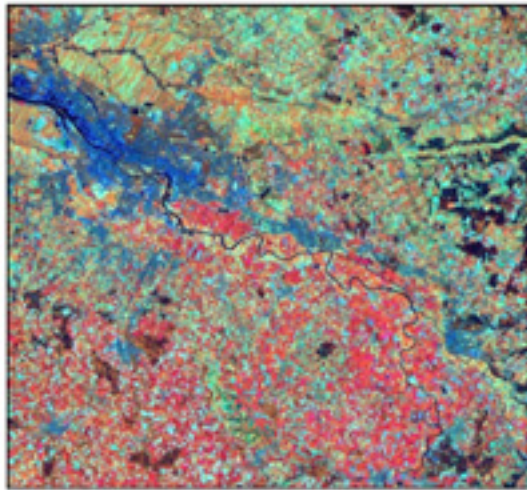
IKONOS pan-sharpened



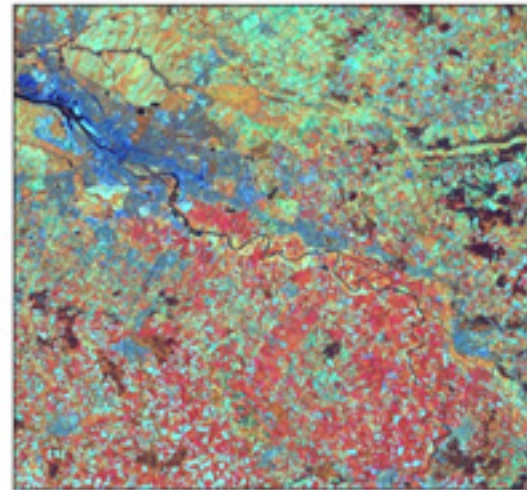
QuickBird

from spectral + (textural) to thematic information

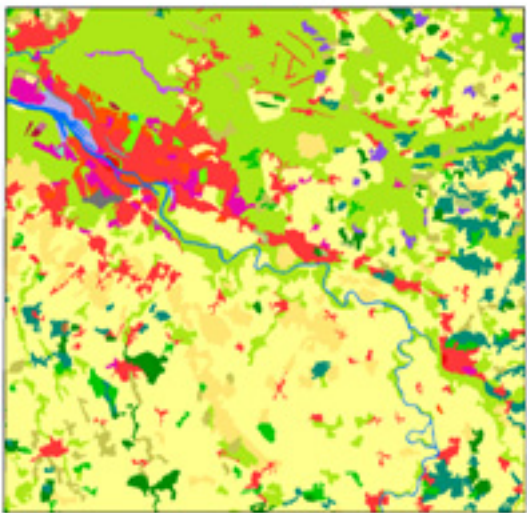




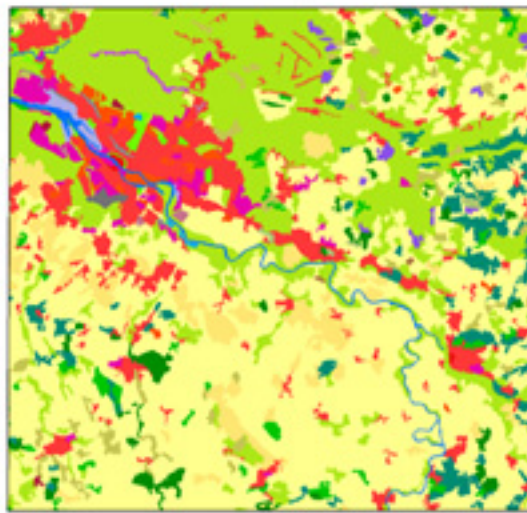
Landsat-5 from 25 May 1989



Landsat-7 from 15 May 2000



Revised CLC1990 dataset

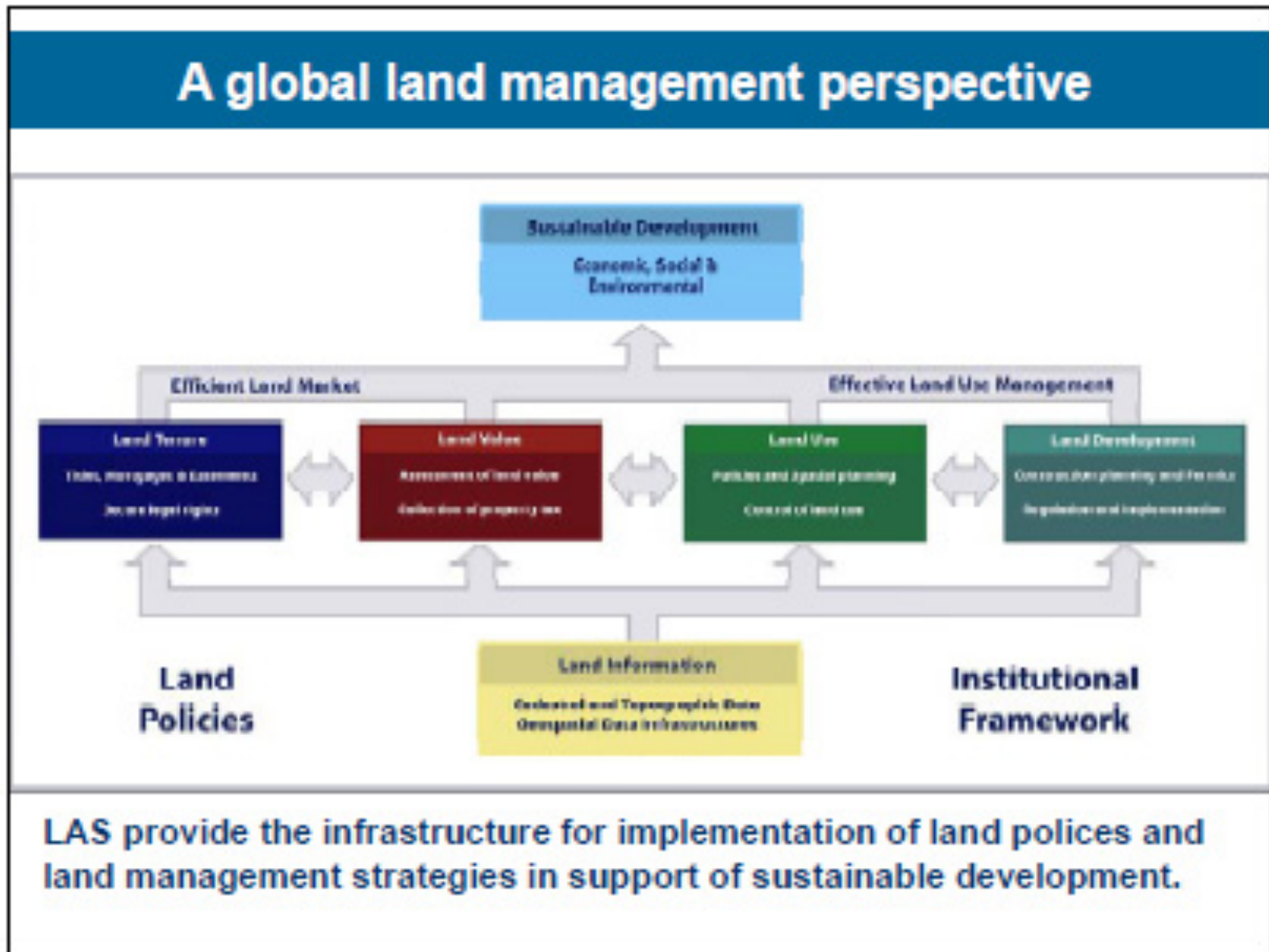


CLC2000 dataset

# 4. GIS for Data Spatial Management



# 5. Land Management for the Social Component



# **New Brunswick and UNB has been and continues to be a leader in this field**



**Willis Roberts, former Director of Surveys of the Province of New Brunswick laid th foundation to the Land Registration Syszem in the Atlantic Provinces**



**Angus Hamilton has been the early thinker about Canadian Survey Education and Land Registration Systems**



**John McLaughlin has brought the Provincial and Canadian efforts to the international scene**

This is the confirmation to me, that after 50 years our philosophy is still the same:

1. Geomatics is an independent engineering discipline providing and managing spatial information to the society
2. We need continuous input from the sciences and other engineering disciplines, but the exponential growth in computer performance guarantees our growth
3. Society needs our services, which only we can provide because of our professional interest.



# What are then the problems our disciplines are facing?

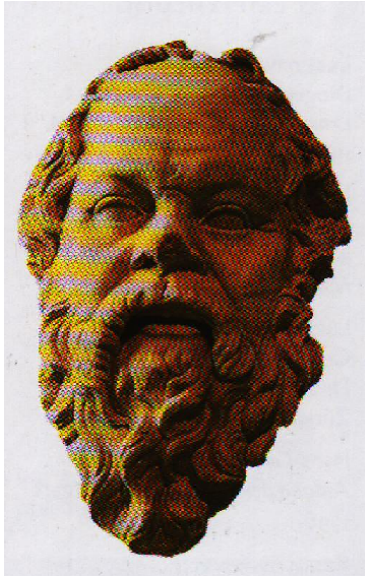
The problems are sociological in nature:

1. do we have political support?
2. do the laws sufficiently protect our professional interests?
3. what is the esteem scientists and engineers have in society?

If we are not sufficiently heard, what are the alternatives for us?

1. to get engaged in social, economic, political and ultimately ethical issues
2. who can give us guidance in our approach to solve problems in integrating photogrammetry and remote sensing into a greater context?

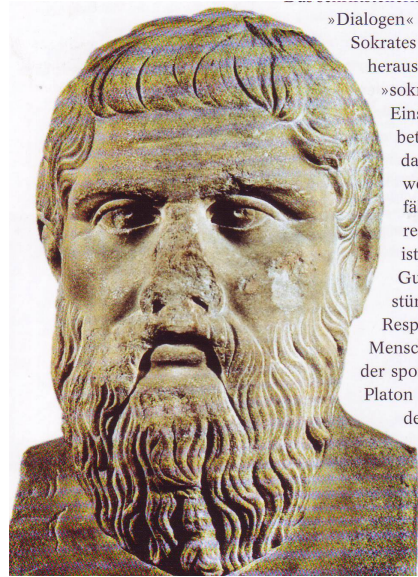
# Corner Stones of our Ethics are the Greek Philosophers



Socrates

469 - 399 B.C.

search for truth  
in modesty



Plato

427 – 348 B.C.

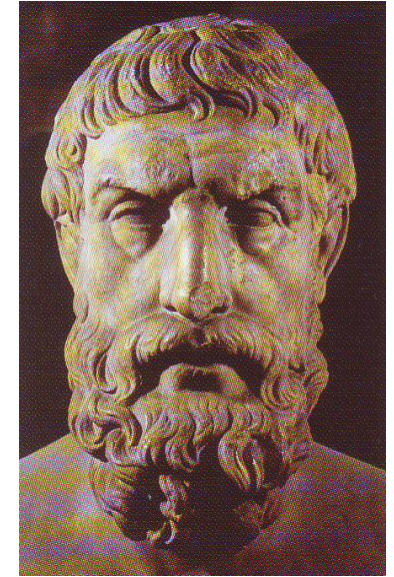
art and science are  
the ideals, highest  
value is equality



Aristoteles

384 – 322 B.C.

ideas are the  
basis of being,  
highest  
value is freedom

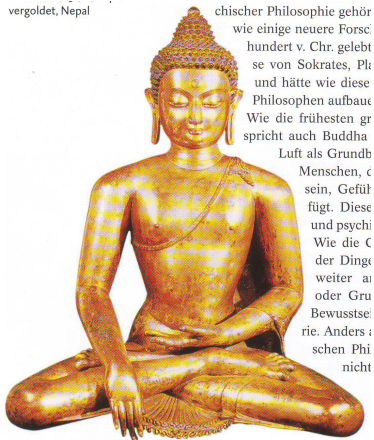


Epicure

341 – 270 B.C.

human aim is  
to enjoy life in  
peace without  
fear

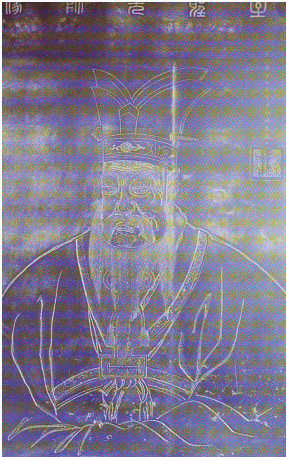
# Drivers of Personal Engagement may be of Religious Conviction



Buddha

5th to 4th cent. B.C.

the world is not perfect, its suffering can be overcome by victory over vices



Confutius

551- 479 B.C.

keep the wisdom of tradition but check whether it is falsified by egotism

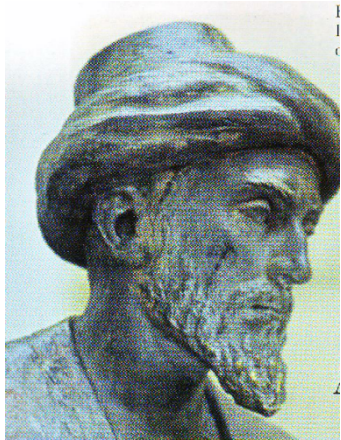


Augustinus

Christian Philosophy Jewish

354 – 430 A.D.

the bad in the world and its temptations can be overcome by god's grace



Maimunides

1134 – 1204 A.D.

Aristotelian Philosophy is not in disagreement with the Talmud or the Koran

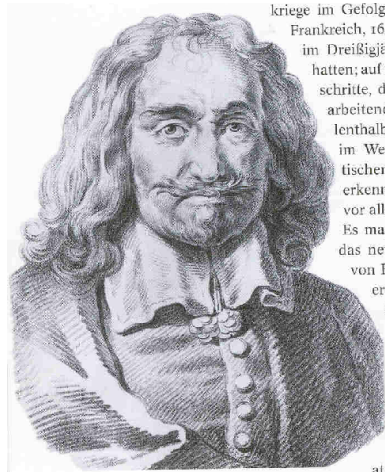


Averroes

Moslem Philosophy

1126 – 1198 A.D.

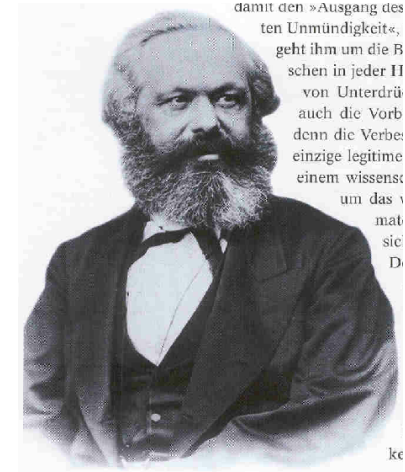
# or of philosophical and political convictions



Thomas Hobbes  
1588-1679 said  
„man is a wolf“

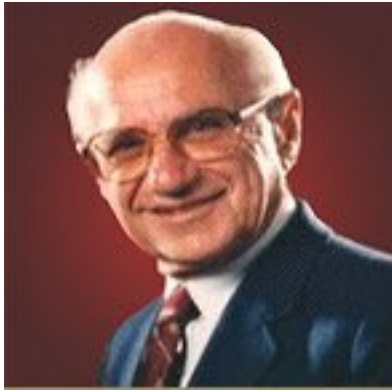


Adam Smith  
1723-1790 said  
„capital means progress“



Karl Marx  
1818-1883 said  
„capital needs to be  
redistributed by the  
proletariate

## or an economic issue



Milton Friedman  
1912-2006  
USA

neoliberalism:  
minimal  
state involvement,  
privatization,  
efficiency in business,  
riches for a few,  
increase of poverty



John Maynard Keynes  
1883-1946  
England

„new deal“ philosophy  
the state must take  
an active role,  
social market economy,  
of Germany,  
the „Chinese model?“

# Questions we need to answer

1. what do we know? what are our limitations (Kant)  
(Socrates: „I know, that I know nothing“)
2. what are our values? (religion, philosophical ideas)
3. how do we interrelate with society? (Epicure versus Marx)
4. how do we achieve
  - sustainable development (UNCED Rio 1992)?  
by good governance?
  - sustainable happiness (where is paradise)?  
by moral standards?
  - a sustainable world (environment, peace)?  
by tolerance?

# possible answers

1. We are too busy and do nothing (present Western society), when problems arise there is despair
2. We take our answers from our religious beliefs (for dogmas, there may be lack of tolerance and conflict)
3. We take advice from philosophers (they analyzed it all, but they are unable to tell us what to do)
4. So we must find our own answers

# Conclusions:

1. We are in a globalized world
2. So that our geoinformatics profession does not become the playball of new capital structures we need our professionalism
3. Quality can only be assured by our professionalism, which is based on solid education and lifelong learning



## the „sociological cast system“

- |                 |                            |                          |
|-----------------|----------------------------|--------------------------|
| 1. highest cast | keepers of the myth        | priests, polititians     |
| 2. second cast  | those giving health to men | medical<br>doctors       |
| 3. third cast   | those giving rights to men | lawyers, the<br>military |
| 4. lowest cast  | helpers of the throw       | scientists,<br>engineers |

## In retrospect, the answer is simple:

1. We should not be, what is sometimes called an idiot of our specialization, we need to look across the „fence“. Geomatics is broad enough to do it.
2. We should focus our work on society's needs, the environment, world poverty, world peace
3. We should communicate our possible contributions to those who need to know
  - our politicians
  - the professional elites
  - the public
4. Society will always criticize what you say, but not, what you do



































