"Science for Poverty Eradication & Sustainable Development: A Call for Action", Manaus, Brazil, December 3 ~ 6, 2014

Experience of Korea and Suggestions

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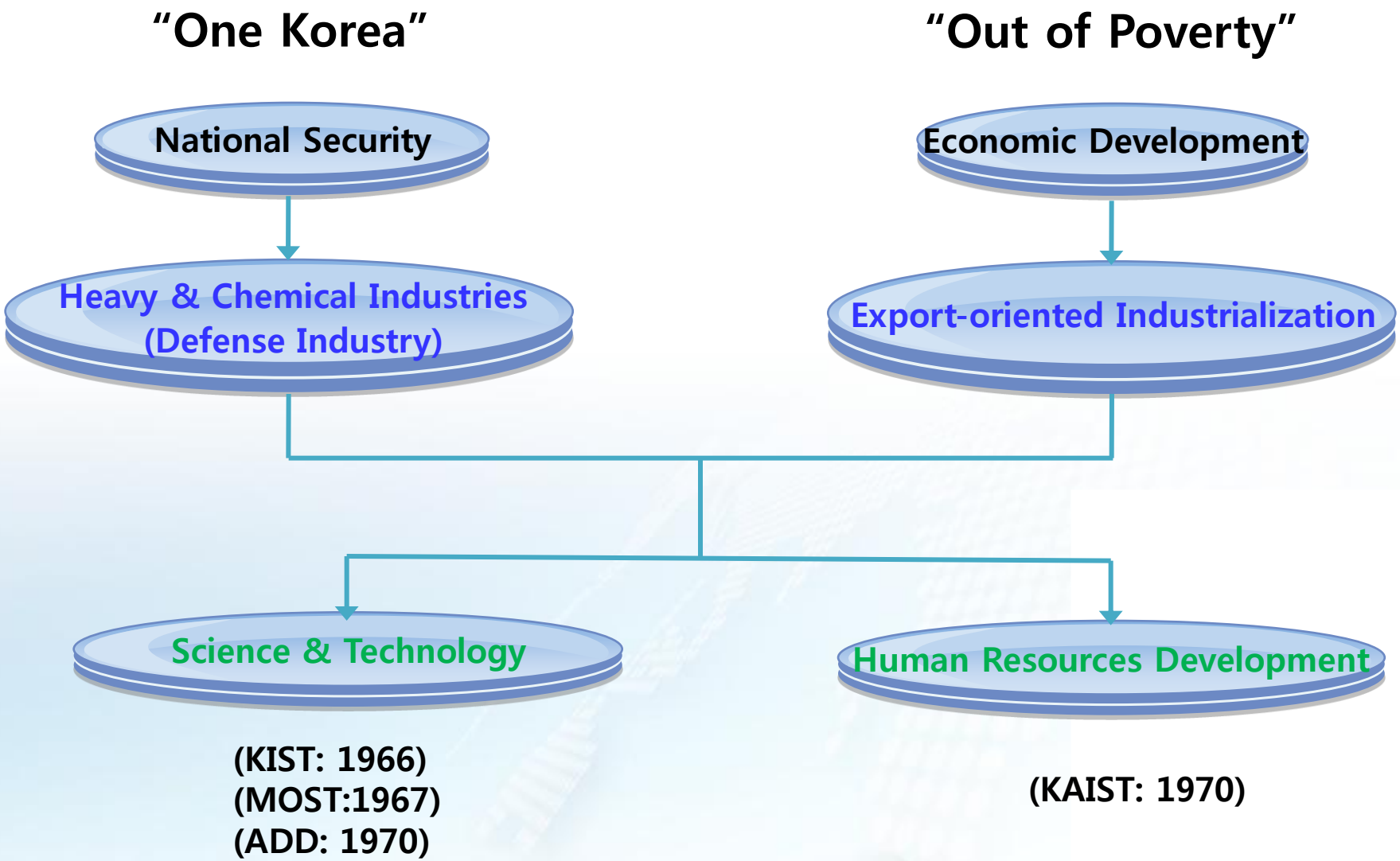
1. Introduction – Brief History of Korea

Yoha civilization **(Dangun Mythology)**	• **? → 3000 B.C.**
Three Kingdoms **(Goguryeo, Baekje, Silla)**	• **57 B.C. – 668 A.D.**
Unified Silla	• **668 - 935**
Goryeo Dynasty **(Metal Type)**	• **918 - 1392**
Joseon Dynasty **(Sejong the Great, Hangul, A rain gauge)** **- Opening of Ports (1876)**	• **1392 – 1910**
Japanese Rule	• **1910 - 1945**
Two Koreas, North & South **- Korean War (1950 – 1953)**	• **1945**

National Goals



2. Industrialization

1960's - Petroleum Refineries

Petrochemical Industries

1970's - Steel Manufacturing

Shipbuilding

1980's - Automobile

1990's - Semiconductors

2000's - Displays, Cell Phones

Stages of Technology Development

1.Import of Foreign Technology (Turn-key Basis)

2.Absorption of Advanced Technology

3.Improvement and/or Upgrade of
Imported Technology

4.Independent Innovation of Technology

- Product Innovation → New industry
- Process Innovation → Improved productivity

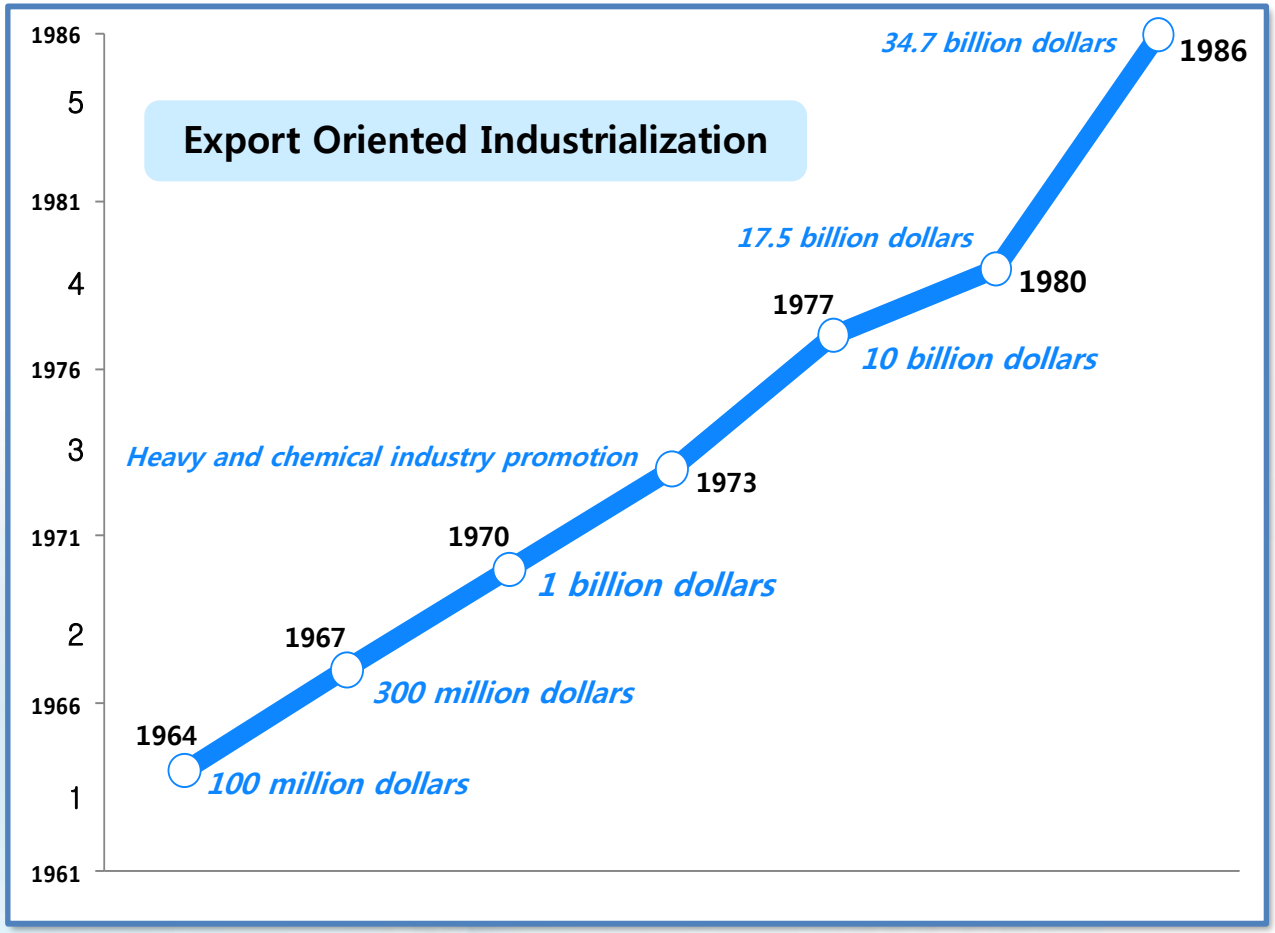
Original View of the Site for Ulsan Petrochemical Complex (1962)

Night View of Ulsan Petrochemical Complex in 2010

U Han Plant in China of SK Innovation (2013.06.30)

Early Industrialization Stages

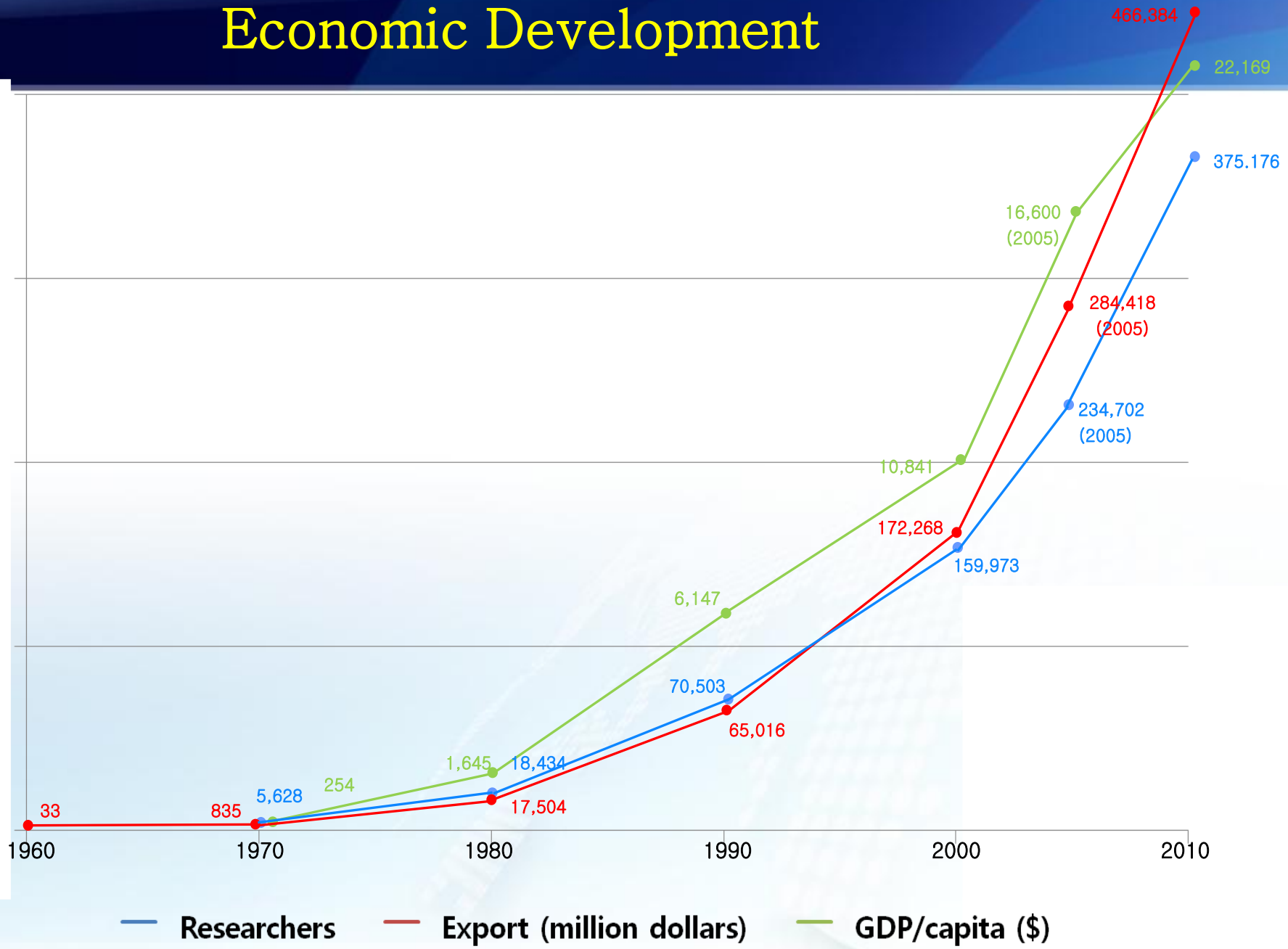
5-year economic development plans



Trends in Economy and R&D Indicators

	1963	1970	1980	1990	2000	2005	2010	2013
GDP (billion dollars)	1.7	8.7	64.3	270.3	567.8	898.0	1,095.4	1,316.0 13th
GDP/capita (dollar)	100	243	1,645	6,147	10,841	16,600	22,169	26,204
Export (million dollars)	86.8	835.2	17,505	65,016	172,268	284,419	466,384	559,632 8th
Total R&D (million dollars)	4	33	428	4,676	13,849	23,580	39,909	54,100 6th
Government : Private (%)	97:3	71:29	64:36	19:81	25:75	24:76	27:73	27:73
R&D / GDP (%)	0.24	0.38	0.66	1.73	2.44	2.99	3.74	4.15 1st
Researchers		5,628	18,434	70,503	159,973	234,702	345,912	410,333 6th

Economic Development



3. R & D for Science and Technology

Korea Institute of Science & Technology (KIST)

- National Symbol of Modernization

- 1965. 5 Korea-U.S.A Summit Meeting in Washington, D.C.

  President Johnson's Initiation for reverse brain-drain

  President Park's Leadership of National Building
- 1967. 2 KIST established as the Brain-Hub
- Private, but Government-funded Research Institute (GRI)
- Contract-base Research Institute
- Non-profit
- Full Autonomy

First R&D Institute in Korea

US-Korea Contract under US-AID Program(1965) on
"Foundation of a research institute for Korea's growth in industrial technology and applied science"

1966 and 2014 of KIST

KIST-1966

Staff : 50

Budget : 780 Thousand USD

KIST-2014

Staff : 727

Budget: 270 Million USD

KIST / early days

- Brain shelter
  for national industrialization planning
- Reverse-engineering mostly
- Cooperation in industrial R&D
- Role model of R&D management
- Incubator of specialized GRI's
  - 27 spin-off GRI's

International Cooperation

Annual Joint Symposiums

CAS (China), **CEA**, **CNRS LIA** (France), **IISc** (India), **MSU** (Russia),
BNL, **Purdue University** (USA), **ORNL** (USA), **AIT** (Thailand),
Korea-Germany Nanophotonics Workshop, Korea-South Africa Joint Workshop

KIST ODA

IRDA

- International R&D Academy

Project

- Indonesia, Establishment of a Research Lab for Natural Products
  - ($2.5 million, 2009 ~ 2012)
- Vietnam, Sharing Korean Development Experiences
  - ($1.2 million, 2010 ~ 2011)

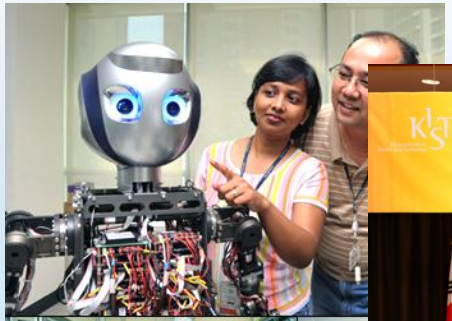
Other

- Mongolia-Korea S&T Cooperation Center

International R&D Academy (IRDA)

Educating prospective scientists and engineers from developing countries to become the leading researchers in the academia and industry

- **Master and Ph.D degree in Science and Engineering**
  - 110 students, 18 countries (219 alumni, 34 countries)
- **World Class Educational Environment :** Facilities, Equipment, Materials, R&D System
- **Full Scholarship :** Tuition fee, Stipend, Dormitory, Insurance



Establishment of a Pilot Production Plant for Bio-energy

Assisting research laboratory for energy, environment and natural substances

① **Project site** : Research center for chemistry, Indonesian Institute of Science(LIPI), Serpong, Indonesia

② **Project period** : 2010~2012

③ **Estimated cost** : USD 2.2 million

- including construction of a pilot plant, feasibility study, training program, consultation

V-KIST

Establishing Korea-Vietnam Institute of Science and Technology in Vietnam based on KIST Model

① **Project site** : Hanoi, Vietnam
② **Project period** : 2014.12~2018.12
③ **Budget**
- 1st stage : USD 70 million (50% from Korean Gov't & Vietnam Gov't, respectively)

④ **Project Content**
- Master Plan, building construction, training program, research equipment, consultation.

4. Human Resources Development

1. Reverse Brain Power
   - Intellectual groups in various sectors

2. Universities
   - Remarkable increase in number : more than 200 four-year universities and colleges now
   - Extremely high % of university enrollment
   - Attraction of excellent students to Sci. & Eng. schools

3. Science & Technology Institutes
   - KAIST (Korea Advance Institute of S & T), GIST, DGIST, Science High Schools, Schools for Talented Students, Meister High School, etc.

※ All of these provided an excellent manpower reservoir.

5. Saemaul Undong (New Village Movement)

Rural Reconstruction Campaign

- President Park Jung Hee's initiation in 1970

-Spirit of "We can do it!"in rural areas

-Working Principles : Diligence, Self-help, Cooperation

-Better life of not only individuals but also the people in traditional communities as a whole

Stages of Saemaul Undong

Stage 1	1970 ~ 1973	Foundation and Groundwork
Stage 2	1974 ~ 1976	Proliferation
Stage 3	1977 ~ 1979	Energetic Implementation
Stage 4	1980 ~ 1989	Overhaul
Stage 5	1990 ~ 1998	Autonomous Growth

※ In 1971 'Tongil Breed Rice'was developed to increase the rice production by 40%.

※ After several years, the quality of life in rural areas became as good as that in urban area.

Saemaul Undong (2)

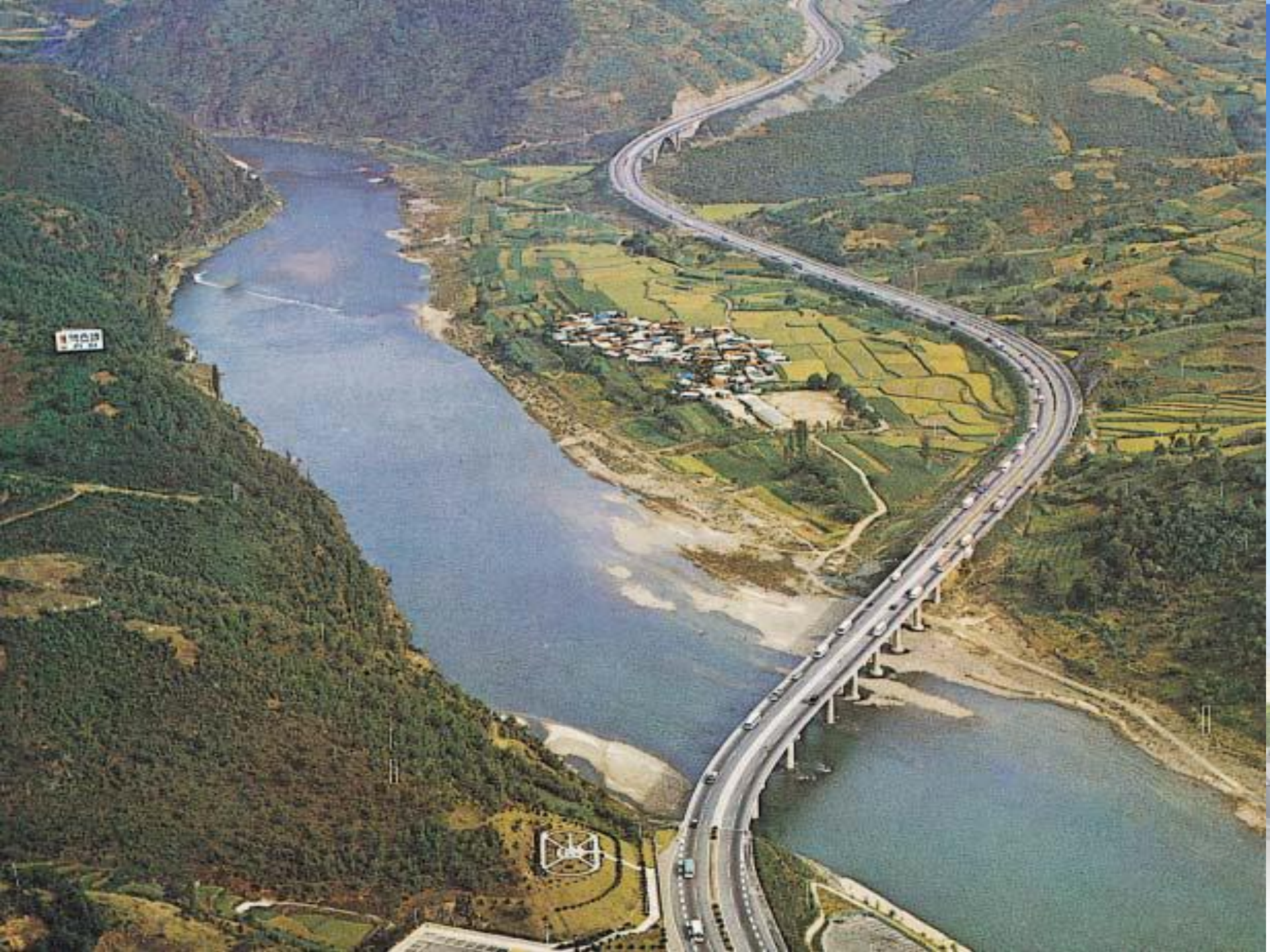
- Naturally, the movement had diffused to urban areas:
  organizations, schools, factories, military, etc.
  → nationwide movement.
- Turned to be operated by private organization
  instead of government
- Globalization leads to ODA programs
  1. Training of Saemaul Undong leaders
     → 50,000 leaders from 103 countries so far
  2. Policy Consulting
  3. Expert and/or Volunteers Dispatch
  4. Technical Cooperation – Appropriate Technology
  5. Project Operation

※ Currently, focus is on Rwanda, Laos & Myanmar.


자율청소대


우리의 고향, 농촌을 살립시다.
농촌사랑 새마을 영농봉사활동
서울특별시 강북구


아 동 문 고
아동문고



6. Sustainable Development

1. Low Carbon Green Growth

Green Car

- Electric Vehicle, Hybrid car, Hydrogen car
- Secondary batteries, fuel cells

Solar Cell Power, Wind Power, ESS, etc.

Emission Trading Scheme (from Jan. 2015)

Green Climate Fund (GCF, international)

- established in 2012 with secretariat in Korea
- $9.3 billion fund secured last month

Global Green Growth Institute (GGGI, international)

- established in 2010 with secretariat in Korea
- a bridge between developed and developing countries

Green Technology Center (GTC, local)

- Technology development and transfer to developing countries

Sustainable Development (2)

2. Four Grand River Restoration (2009 ~ 2012)
   - Restoration of main streams has been completed.
   - Upstream branches are to be restored.

3. Nuclear Power Plants
   - 23 NPP's are in operation now, 5 under construction
     6 decided, and 8 more under planning

4. Creative Economy

5. World Peace Park in DMZ

6. Expansion of ODA (0.15% of GDP)
   - Number of countries with major emphasis: 12 in Asia,
     2 in Middle Ease, 8 in Africa, 4 in Central & South America

7. What made it happen & How did it happen?

- **Strong Leadership & Government-led Drive**
  - 5 Year Economic Development Plans
  - Saemaul Undong
  - Low Carbon Green Growth

- **Establishment of Brain Hub**
  - Institution Building
  - Reverse Brain-drain (unprecedented incentives)

- **Good "Plan" and Consistent "Do"**

- **Presidential Pledge of GDP 5% for S&T**

8. Post-2015 SD Goals

SDSN's Views of Architecture for SD

- Environmental Sustainability
- Economic Development to end Poverty
- Social Inclusion

On the Foundation of Security and Good Governance

- Environment can be improved along with economic development.
- Economic growth with environmental sustainability
  → Green Growth (a new paradigm for economic development)
- Therefore, 'take-off' of economic development is the most important.

How to take-off?

1. Establishment of Brain Hub
   - e.g., KIST, KAIST, COPPE
2. Education and Training (HRD)
3. Industrialization/Job Creation
4. Building the spirit of "Can-Do" among the people
   - e.g., Saemaul Undong
5. Strong Leadership and Government Drive
6. Consistent Government Policy and Strategy

THANK YOU