Transmission control of schistosomiasis japonica :

implementation and evaluation in different control interventions

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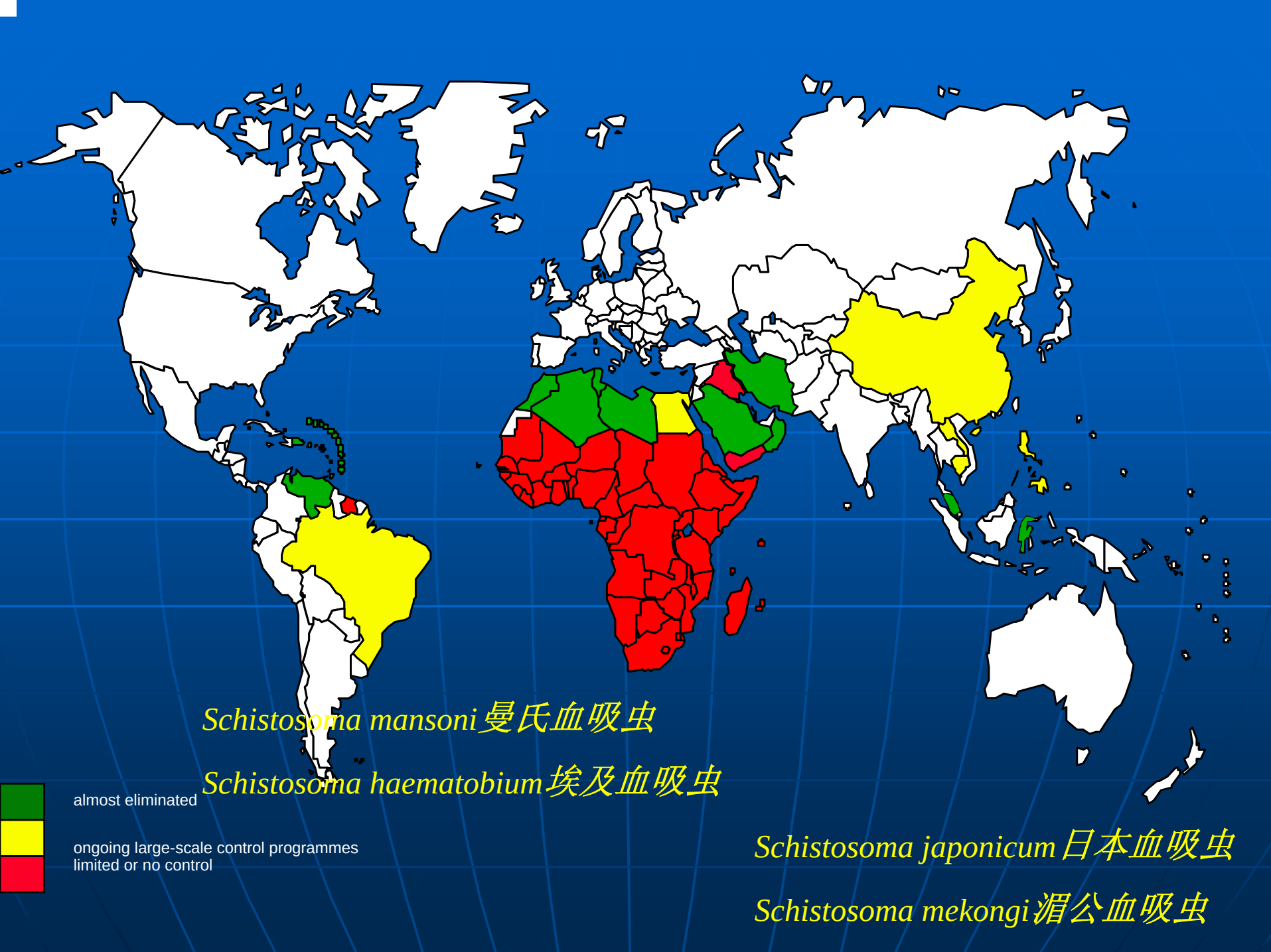

Schistosoma mansoni曼氏血吸虫
Schistosoma haematobium埃及血吸虫
almost eliminated
ongoing large-scale control programmes
limited or no control
Schistosoma japonicum日本血吸虫
Schistosoma mekongi湄公血吸虫

- It was report from WHO that
- 76 countries has prevellance schistosmiasis;
- The population of 6.5 Hundred million is threatened
- and infected people is 1.9 Hundred million in the world.

History of schistosomiasis endemic in China

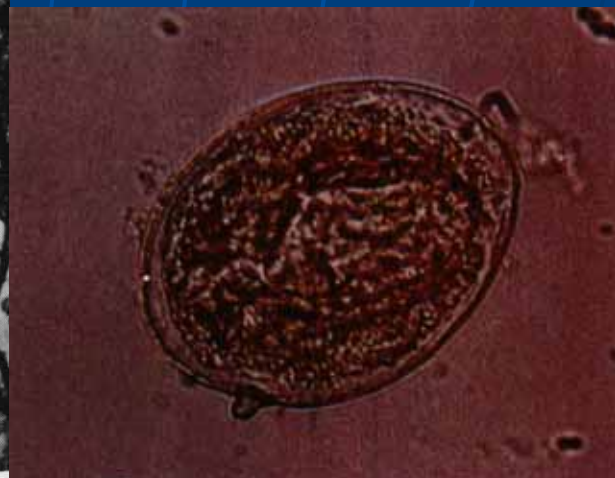
- Epidemic of Schistosomiasis is longinquity in China. 1975, the eggs of schistosomiasis was discovered in ancient body in Hubei province，it proved the disease was prevalence at less more than 2100 years.
- The snail of *Oncomelania hupensis* which is intermediate host of schistosomiasis was fund at Wuchang county in Hubei province of China in 1881 by German scholar of Gredler.

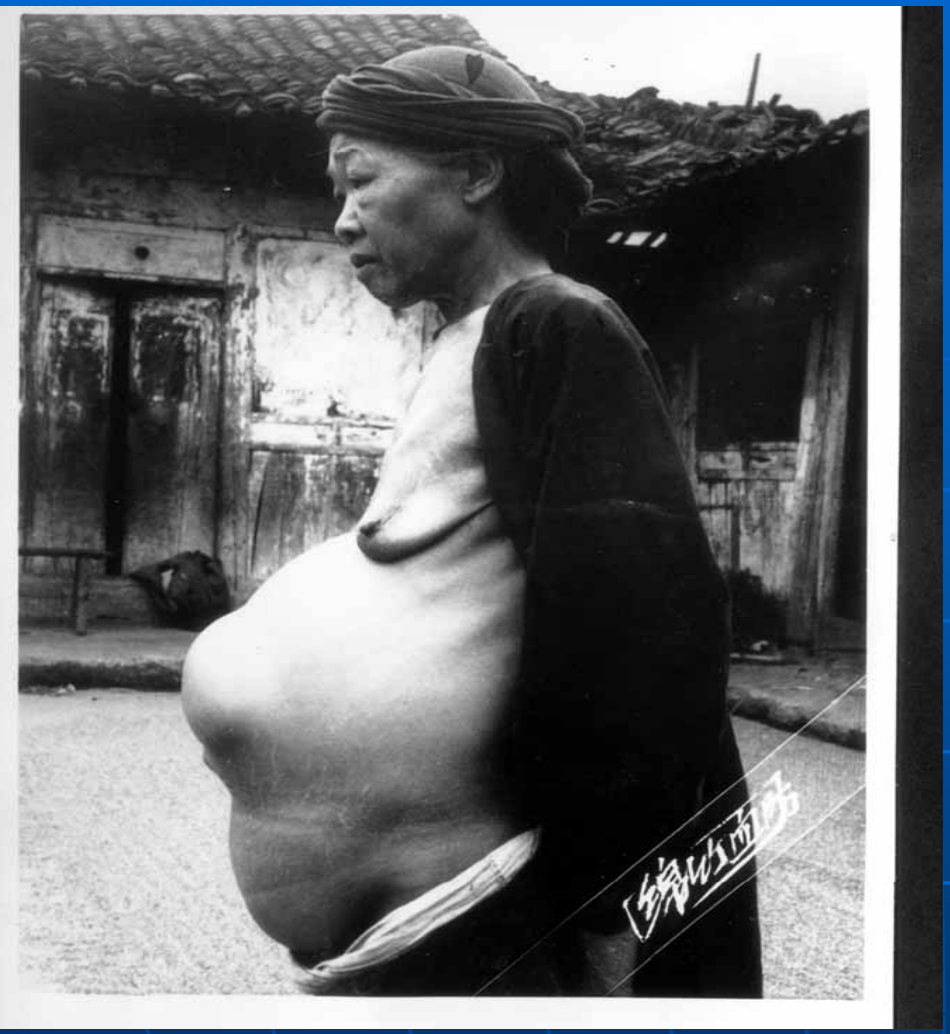
- 1904, the worm of schistosomiasis was discovered by Japonic scholar of Katsurada in cat. So named *Schistosoma japonicum.*
- 1905, the first patient of schistosomaisis was found in Hunan province in China

Schistosomiasis eggs was discovered in ancient body at Hubei in 1975

1975年，在湖北出土西汉男尸

肠道内发现血吸虫虫卵，证实2100年前血吸虫病已在我国流行





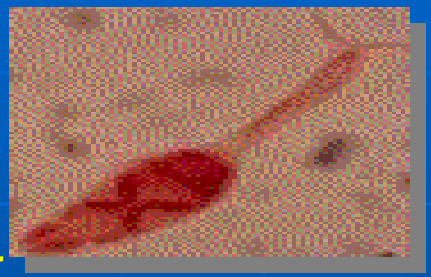
lot of advanced case of patient was popular before liberation in 1949

- It was reported in 1950', the patient was 11.6 million, infected bovine was 1.2 million head, snail area was 14.3 billion m^2, the population was over one handred million in endemic area in China.
- By 2004, the patient was dropped to 0.84 million, that decreased 93%, snail area was 8.4 billion m^2, that decreased 74%. infected bovine was about 0.3 million head, that decreased 75%.

- The snail *Oncomelania hupensis*, which acts as the intermediate host of *Schistosoma japonicum*, occurs in East and Southeast Asia, i.e. China, Indonesia, Japan and the Philippines. In China, *O. hupensis* is distributed along and in the south of the Yangtze River in 12 provinces.
- The altitude of the snail distribution ranges from sea level in Shanghai up to 2400 m above sea level in Yunnan province .

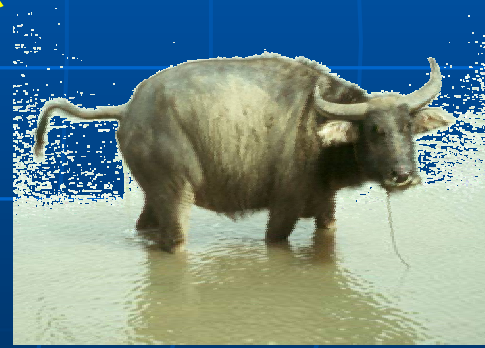
Distrribution of schistosomiasis in China

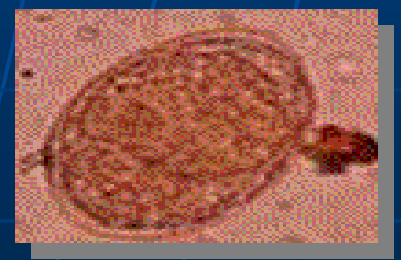
3. 日本血吸虫
生活史环节多



尾蚴
sercaria

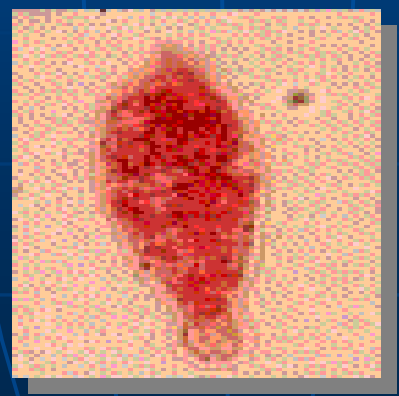
成虫





虫卵egg

毛蚴
miracide



钉螺
snail

Mountain area

Lake and marshland area

water netting area

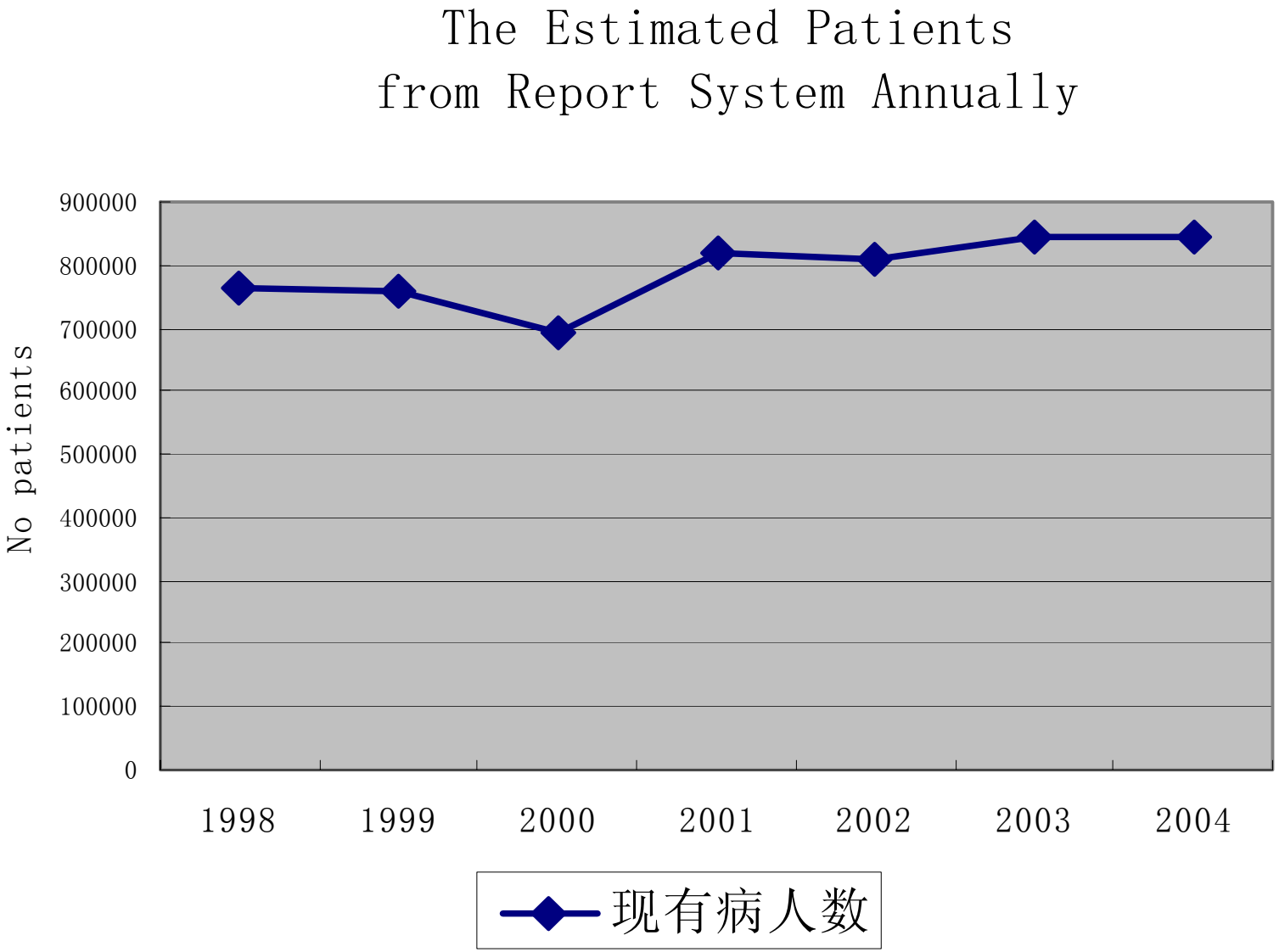
4. 环境复杂： 三类血吸虫病流行区环境不同

当前流行形势
Current situation

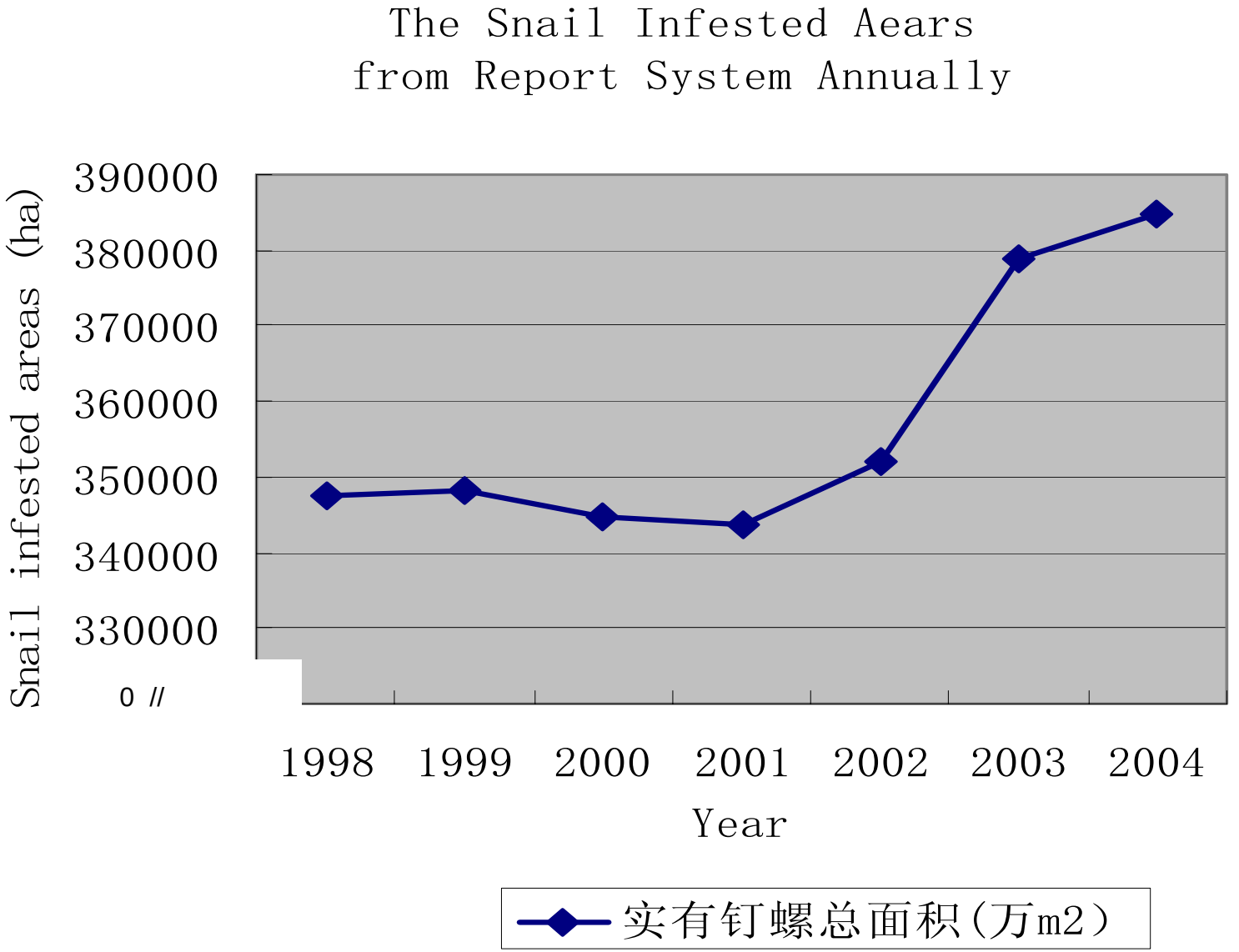
- 1、病人数居高不下，急性感染呈上升趋势
- The patient increase and infected rate goes up
- 2、钉螺扩散明显，人畜感染的危险增加
- The snail spread seriously,
- 3、新疫区不断增加，部分已控制地区疫情严重回升
- New endemic area increases
- 4、血吸虫病正在向城市蔓延
- Schistosomiasis overspread to city and urban area

- 5 自然环境因素复杂，防治难度大
- Natural and social factors complex
- 长江流域洪涝灾害频繁，尤其是1998年特大洪水，使血吸虫病流行区钉螺扩散加剧。
- Flood disaster frequently, that lead to snail spread seriously.
- 三峡建坝和南水北调等大型水利工程建设对钉螺扩散和血吸虫病传播也存在潜在的影响。
- Large water conservation project has a potenial to result in the disease transmission

病人数居高不下，急性感染呈上升趋势



钉螺扩散明显，


The Snail Infested Aears
from Report System Annually
Snail infested areas (ha)
390000
380000
370000
360000
350000
340000
330000
0
1998
1999
2000
2001
2002
2003
2004
Year
实有钉螺总面积(万m2)

血防工作的长期性

- 频繁的洪涝灾害可使多年的防治成果付诸东流、毁于一旦

血防工作的艰巨性

垸外钉螺面积大，水位不能控制，灭螺尚无良策，钉螺随水扩散严重。

垸内钉螺由原来的片状分布演变为点状、线状分布，目前呈现江河—渠道—水田—塘堰—村庄五位一体的格局。

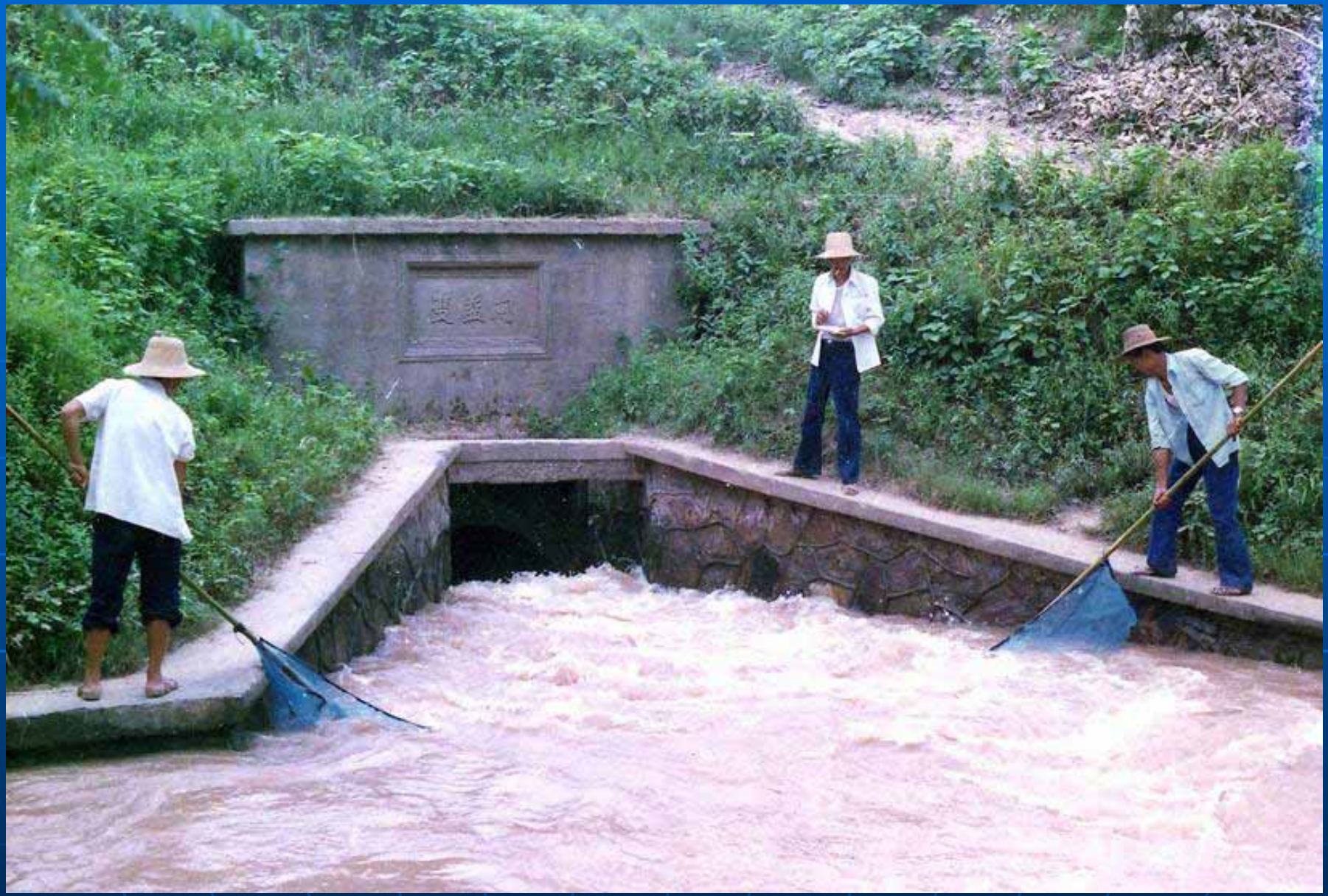
Floodgate in different hole for the function of irrigation

Floodgate of one hole

Floodgate of two hole

Floodgate of three hole

Floodgate of four hole



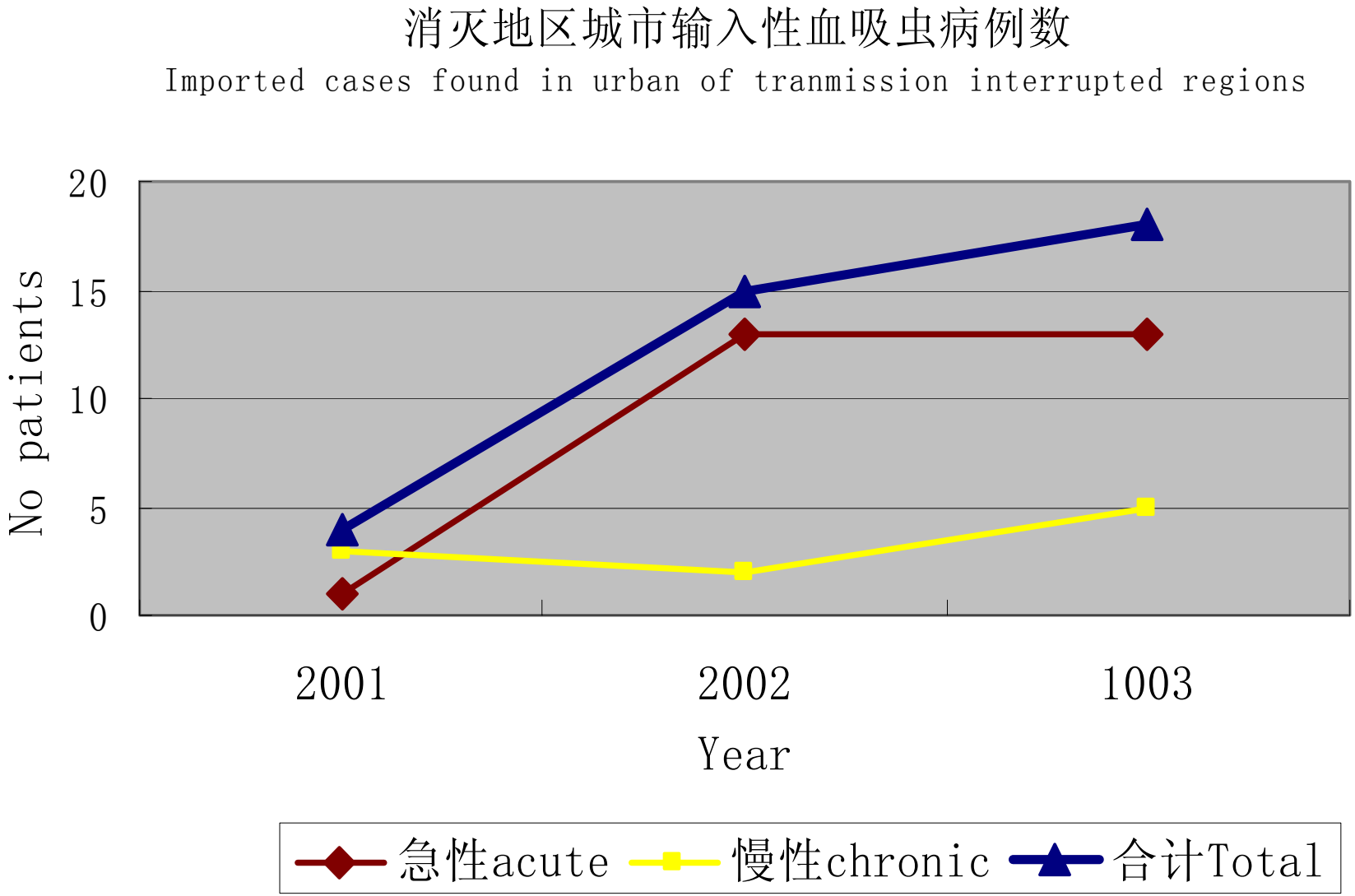
- 钉螺沿水系扩散，加大了灭螺的难度，灭螺成果难以巩固

血防工作的复杂性。

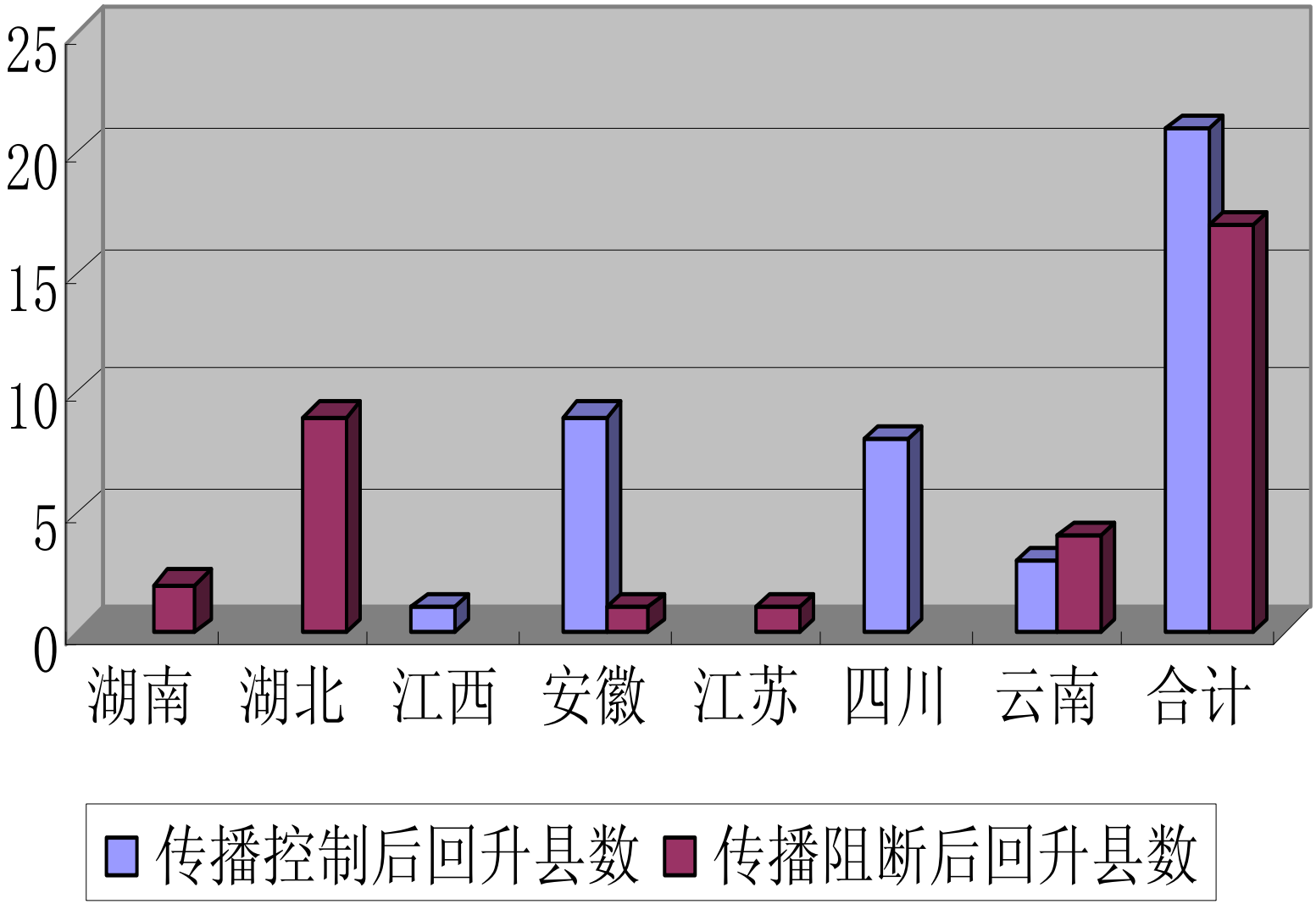
血吸虫病是一种人畜共患的传染病，控制其流行，既要消灭钉螺，切断传播途径，还要加强健康教育和管粪改水。是集人群、动物、医学、生态、环境、农业、水利等于一体的，庞大的社会系统工程，涉及的范围广，部门多，对象复杂。

Risk increase to the people and livestock

血吸虫病正在向城市蔓延



New endemic area increase



Impact of the Three Gorges Dam


南水北调线路示意图
西线
中线
东线
Bohai Sea
Yellow Sea
East Sea
Yellow River
South Canal
Wei Canal
Grand Canal
Nanzhuang Canal
Nansi Lakes
Dongping L.
Luoma L.
Hongze L.
Project of south-north water transfer

Schistosomiasis is zoonosis

- 我国对日本血吸虫mammal animal哺乳动物宿主的调查发现有自然感染的动物有40种，人、畜（兽）共患的疾病zoonosis 。多数家畜及野生动物在血吸虫病传播中具有流行病学意义。
- 自然感染日本血吸虫的家畜和家养动物有bovine牛、pig猪、horse马、donkey驴、mule骡、sheep羊、dog犬、cat猫等；野生动物有sewer rat褐家鼠、house mouse家鼠、wild boar野猪和 monkey猴等。

Bovine play a important role (90％) of transmission schistosmiasis in lake area.

- The quantity on eggs of schistosomiasis in bovine feces is 22.9 times than that of human being.

- 90％—95％of the schistosomiasis egg come from bovine feces and 6％—8％ come from pig feces in marshland area.

- **Relativity of people and bovine**
- The infected rate is consistent between bovine, pig and the people.
- Data showed the infected rate of bovine and pig is 21.8%、29.9%，and the people is also 22.4%。

家畜血吸虫病预防控制措施
Intervention approaches

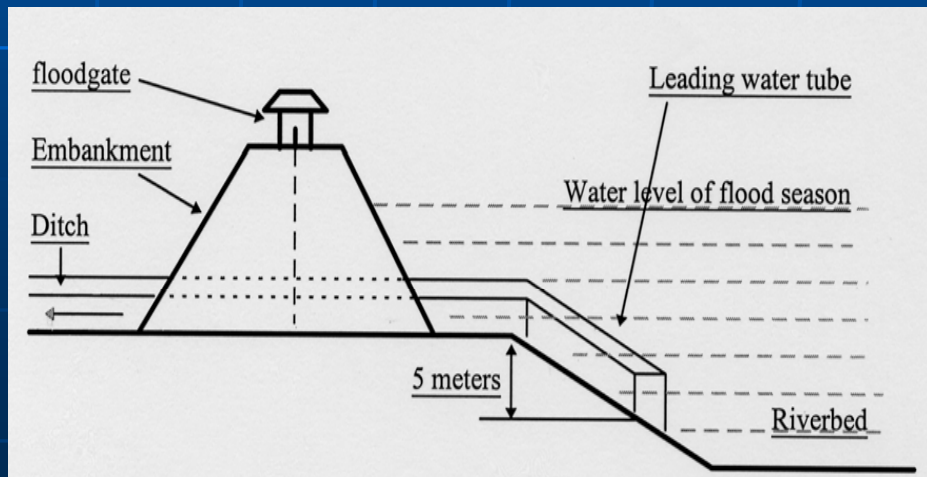
- 疫苗控制动物血吸虫病的研究进展
- Empirical study and field trial on domestic vaccine
- 以机代牛控制血吸虫病的试点
- Pilot study on replacing bovine by tractor for schistosomiasis control
- 人畜同步化疗
- Simultaneously chemotherapy for both human and animals
- 滩地禁牧 (时间 、空间)
- Forbidden grazing on marshlands infested with snails (interval grazing at specific time, alternative grazing)
- 圈养耕牛
- Feed in a pen for cattle

钉螺的预防控制措施 prevention and measurement to the snail

- Chemical molluscicides
- Snail control combined with agricultural production
- Snail control combined with water conservation
- Snail control combined with forestry projects

Mode of control snail spread in the field

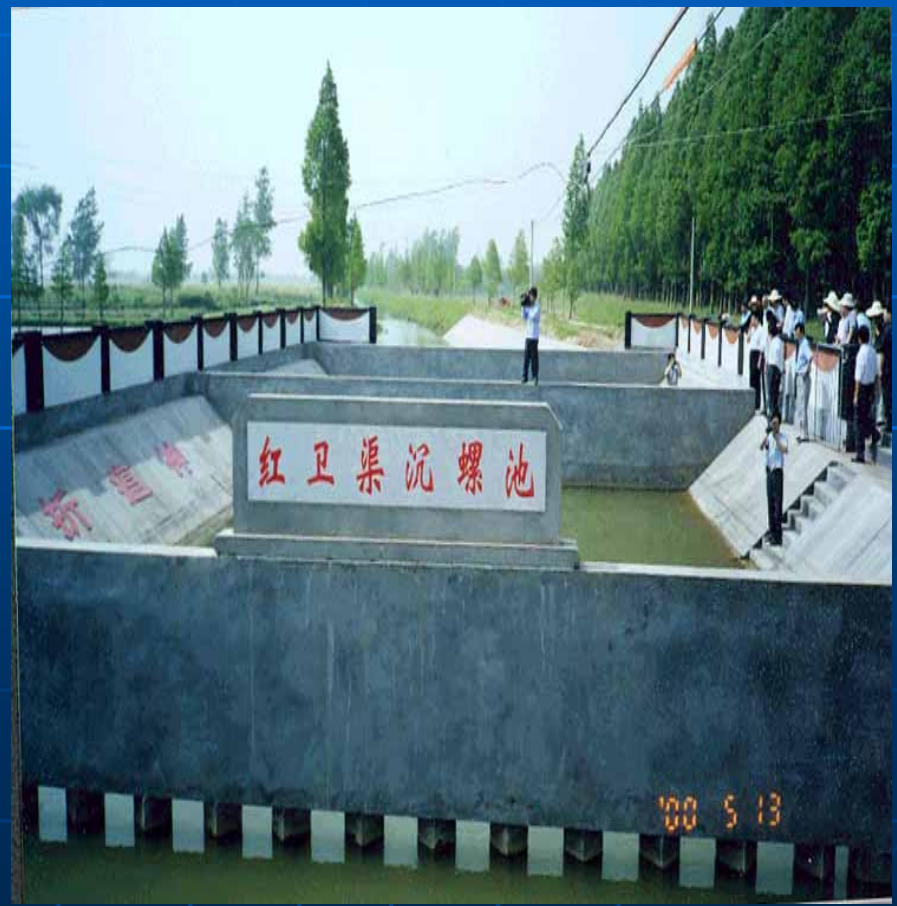
Mode of No.1



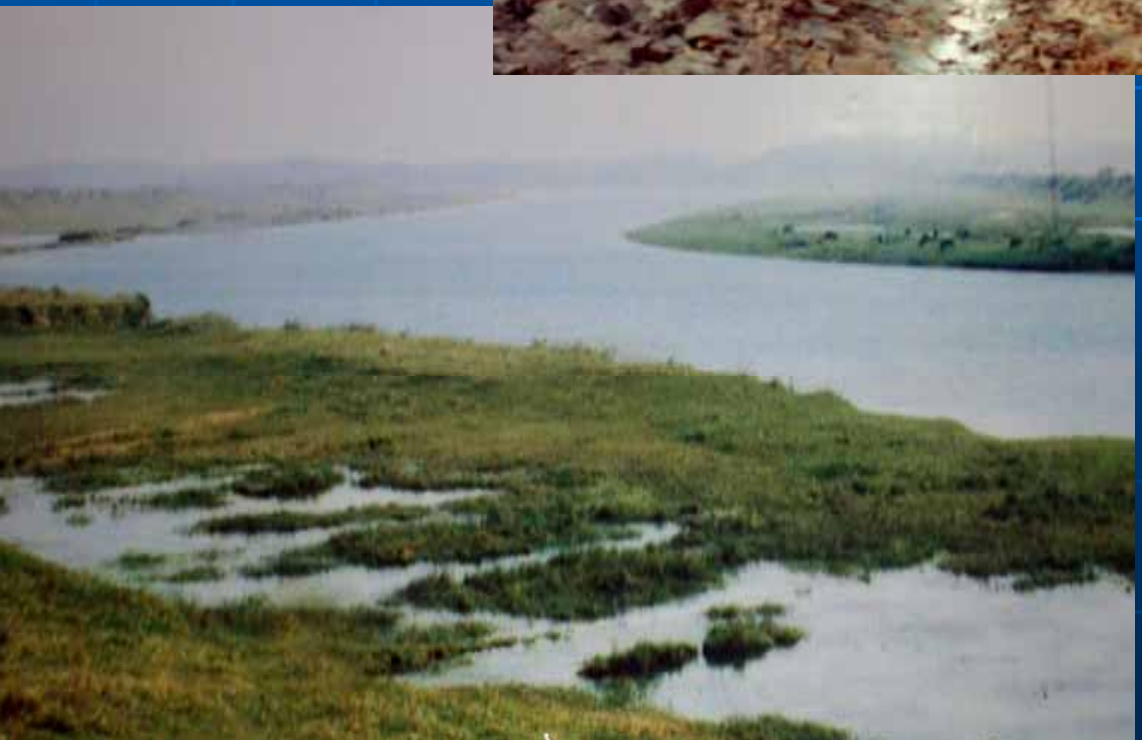
Sketch of facilities of leading water under the surface of the Yangtze River

Mode of No.2

- Based on the principle of dropping speed of snail (The water velocity must be less than 20 cm/s). The facilities with precipitate pond was set up in the field. The effect of control snail dispersal was very satisfied.



农业血防项目
Agriculture project
田地整治（水改旱）



整治后

整治前

水泥沟渠硬化

Canal concrete

硬化前

硬化后

建造养鱼池
fish pond

建造前

建造后

林业血防项目

Forest project

兴林抑螺工程

种植后

种植前

防治工作建议
Recommendation on intervention

- 综合治理工作极为重要。环境的综合治理，如农业产业结构的改变等。
- All intervention need keeping integrated approaches. Environmental modification is a key component in the control programme， for example, alternative crops planting

- 重要传染源，以及多种动物均需重新评估其传播作用。
- The key animal contribution to schistosomiasis transmission in different environmental settings need to reappraise
- 同步化疗非常重要，但家畜管理难度较大，需行政措施(法律规定等).
- Simultaneously chemertherapy is important, need administrative support (regulations, law, good policy, etc.)


Thanks