Economics 172
Issues in African Economic Development

Professor Ted Miguel
Department of Economics
University of California, Berkeley

Economics 172
Issues in African Economic Development

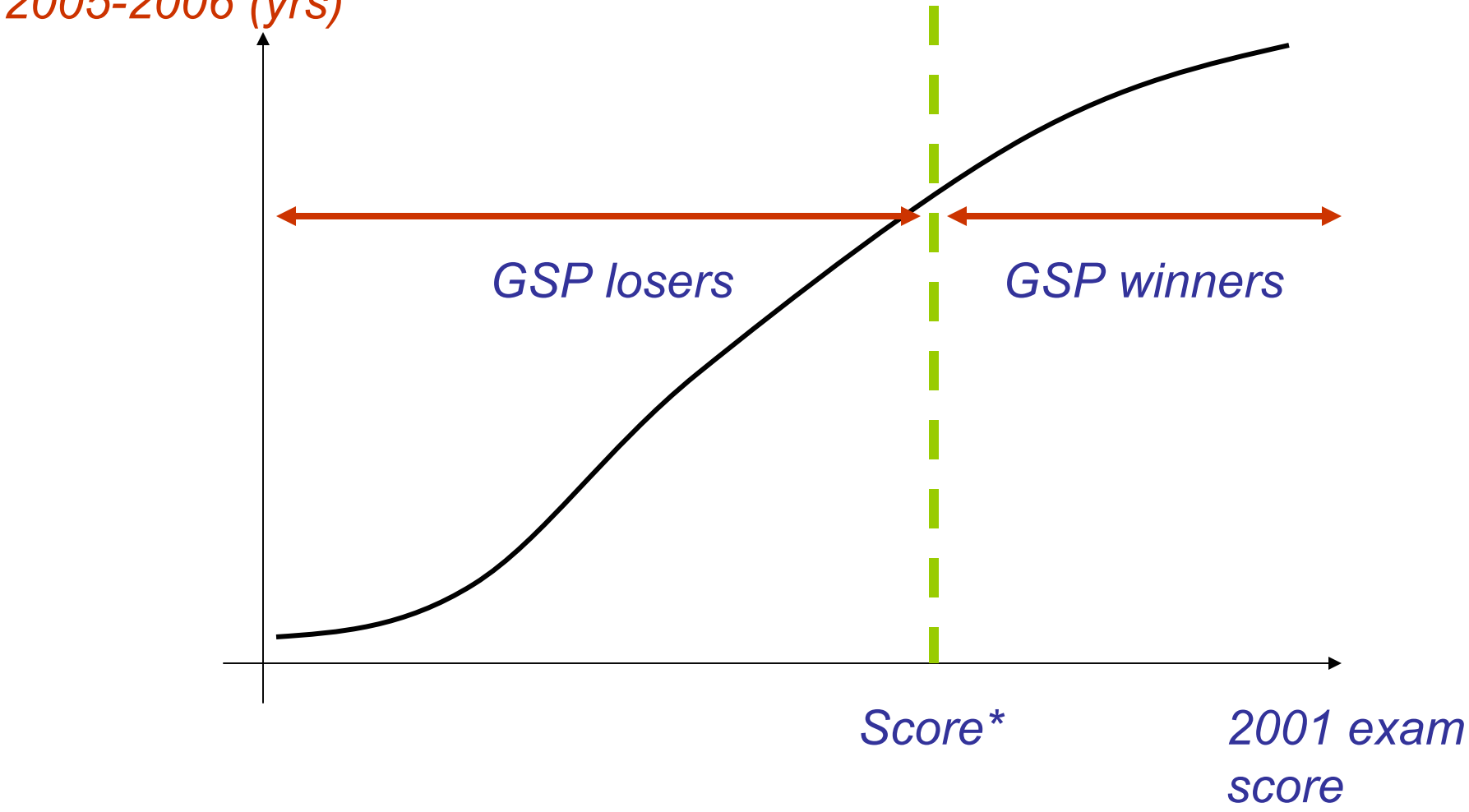
Lecture 17 – March 13, 2007

- The midterm exam is this Thursday March 15th in class

- The midterm exam is this Thursday March 15th in class
- Reader #2 available in Copy Central later this week

The regression discontinuity (RD) approach

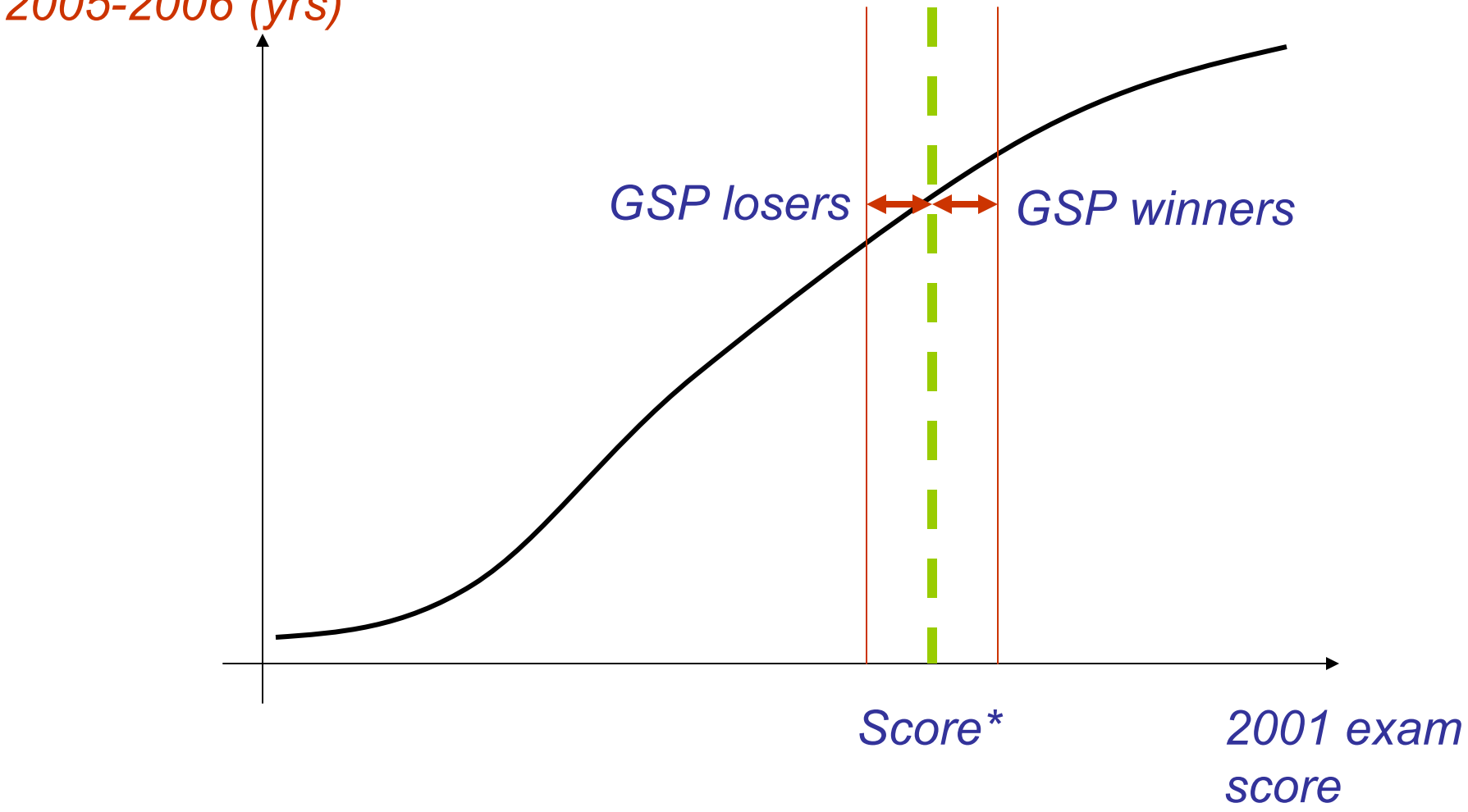
- Clearly comparing scholarship winners to scholarship losers is not a very appealing strategy: the winners are much better students, so losers are not a good "comparison group"


Educational attainment 2005-2006 (yrs)
GSP losers
GSP winners
Score*
2001 exam score

The regression discontinuity (RD) approach

- Clearly comparing scholarship winners to scholarship losers is not a very appealing strategy: the winners are much better students, so losers are not a good "comparison group"

- One way to get around this is to focus on students "very close to" the winning threshold test score level

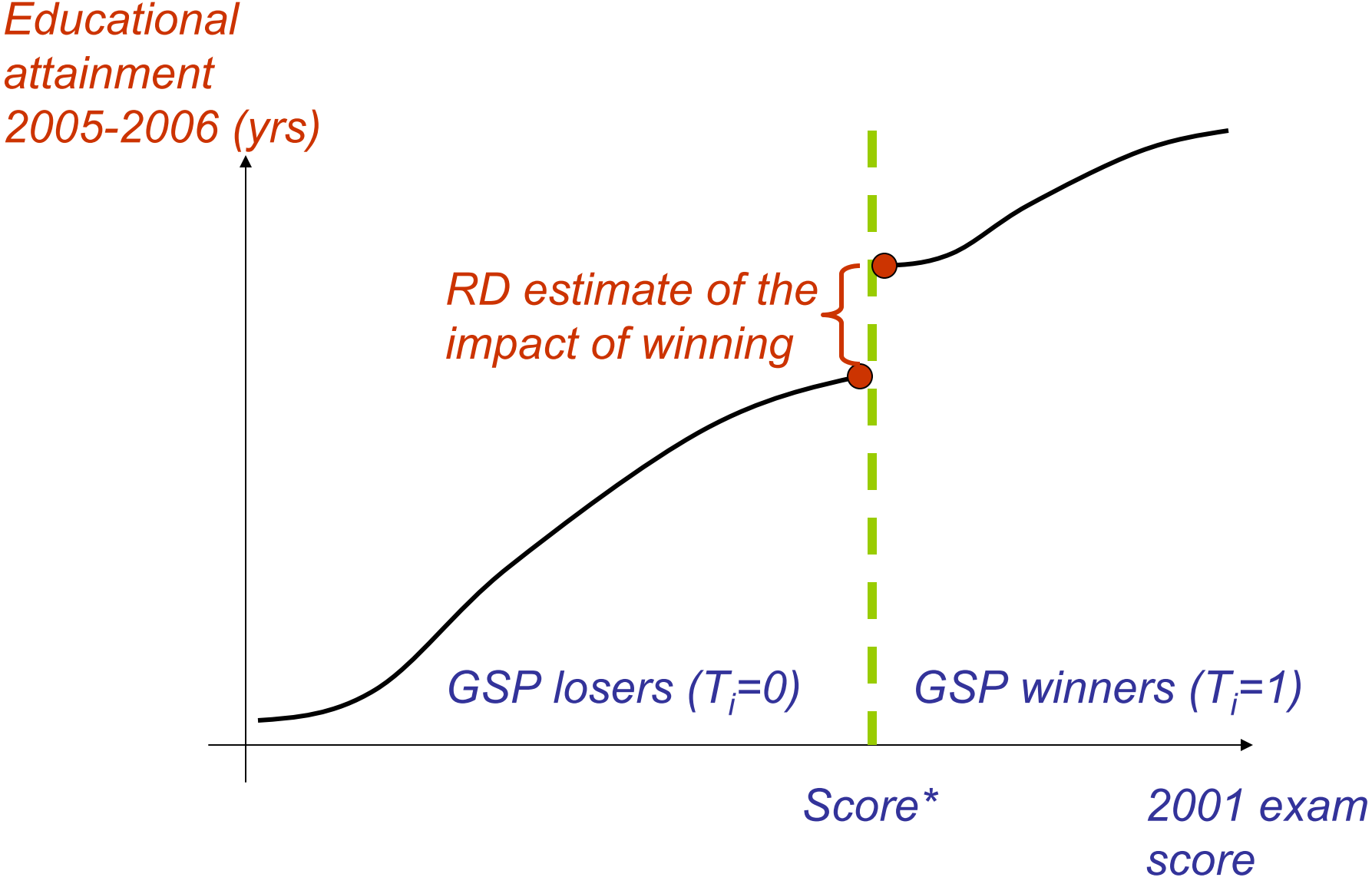

Educational attainment 2005-2006 (yrs)
GSP losers
GSP winners
Score*
2001 exam score

The regression discontinuity (RD) approach

- Clearly comparing scholarship winners to scholarship losers is not a very appealing strategy: the winners are much better students, so losers are not a good "comparison group"

- One way to get around this is to focus on students "very close to" the winning threshold test score level

- In the limit, comparing the student who just barely won (receiving *Score**) to the student who just barely lost (*Score** – ε) should yield a comparison group of losers almost identical to winners along unobservables, too


Educational attainment 2005-2006 (yrs)
RD estimate of the impact of winning
GSP losers (T_i=0)
GSP winners (T_i=1)
Score*
2001 exam score

Treatment effects and omitted variable bias

(1) $Y_i = a + bT_i + cX_i + e_i$

(2) $E(Y_i \mid T_i=1) - E(Y_i \mid T_i=0)$

$= [a + b + cE(X_i \mid T_i=1) + E(e_i \mid T_i=1)]$
$\quad - [a + 0 + cE(X_i \mid T_i=0) + E(e_i \mid T_i=0)]$

$= b + c\,[E(X_i \mid T_i=1) - E(X_i \mid T_i=0)]$

True effect "Omitted variable/selection bias" term

Treatment effects and omitted variable bias

(2) $E(Y_i \mid T_i=1) - E(Y_i \mid T_i=0)$

$= b + c\,[E(X_i \mid T_i=1) - E(X_i \mid T_i=0)]$

Assume that any relevant omitted variables vary "smoothly", so very little, with respect to the test score, and do not "jump" across the winning threshold:

Treatment effects and omitted variable bias

(2) $E(Y_i \mid T_i=1) - E(Y_i \mid T_i=0)$

$= b + c\,[E(X_i \mid T_i=1) - E(X_i \mid T_i=0)]$

Assume that any relevant omitted variables vary "smoothly", so very little, with respect to the test score, and do not "jump" across the winning threshold:

$= b + c\,[\,(x^* + \delta) - x^*\,]$

$= b + c^*\delta$

$\approx b$

Using the RD approach

- More generally RD methods can be used whenever program / treatment assignment has a “sharp discontinuity”, in other words, a very rapid change in the likelihood of assignment with respect to an underlying “smooth” variable (here, the test score)

Using the RD approach

- More generally RD methods can be used whenever program / treatment assignment has a “sharp discontinuity”, in other words, a very rapid change in the likelihood of assignment with respect to an underlying “smooth” variable (here, the test score)

- For example, people may only get a loan if their credit score is sufficiently high. If you compare people with, say, a credit score of 750 versus with 749 they are very similar, but only the former group gets a loan

Using the RD approach

- More generally RD methods can be used whenever program / treatment assignment has a “sharp discontinuity”, in other words, a very rapid change in the likelihood of assignment with respect to an underlying “smooth” variable (here, the test score)

- For example, people may only get a loan if their credit score is sufficiently high. If you compare people with, say, a credit score of 750 versus with 749 they are very similar, but only the former group gets a loan

- RD Limitation: “local” treatment effect at the threshold

Empirical methods so far in the course

- A fundamental econometric concern in empirical economic research: non-random selection into "treatment" / omitted variable bias (OVB)
- Potential solutions:

Empirical methods so far in the course

- A fundamental econometric concern in empirical economic research: non-random selection into "treatment" / omitted variable bias (OVB)
- Potential solutions:

  (1) Control for all relevant factors (challenging!)

  (2) Randomized evaluation

Empirical methods so far in the course

- A fundamental econometric concern in empirical economic research: non-random selection into "treatment" / omitted variable bias (OVB)
- Potential solutions:

  (1) Control for all relevant factors (challenging!)

  (2) Randomized evaluation

  (3) Difference in differences (DD)

  (4) Regression discontinuity (RD)

Empirical methods so far in the course

- A fundamental econometric concern in empirical economic research: non-random selection into "treatment" / omitted variable bias (OVB)
- Potential solutions:

  (1) Control for all relevant factors (challenging!)

  (2) Randomized evaluation

  (3) Difference in differences (DD)

  (4) Regression discontinuity (RD)

- Each of these methods has their own strengths and limitations, although if a randomized experiment is possible, it is usually thought of as the gold standard

Theoretical models so far in the course

- The Solow Growth Model
- Sexual behavior and HIV risk

Theoretical models so far in the course

- The Solow Growth Model
- Sexual behavior and HIV risk
- Within household allocation under extreme scarcity
- Educational investment, time horizons, and gender

Main substantive topics so far in the course

- Patterns of African economic development
- Theories of economic growth
- Geography, health, and development

Main substantive topics so far in the course

- Patterns of African economic development
- Theories of economic growth
- Geography, health, and development
- The economics of HIV/AIDS
- Economic shocks and rural households
- Human capital

Next topic: environmental and development

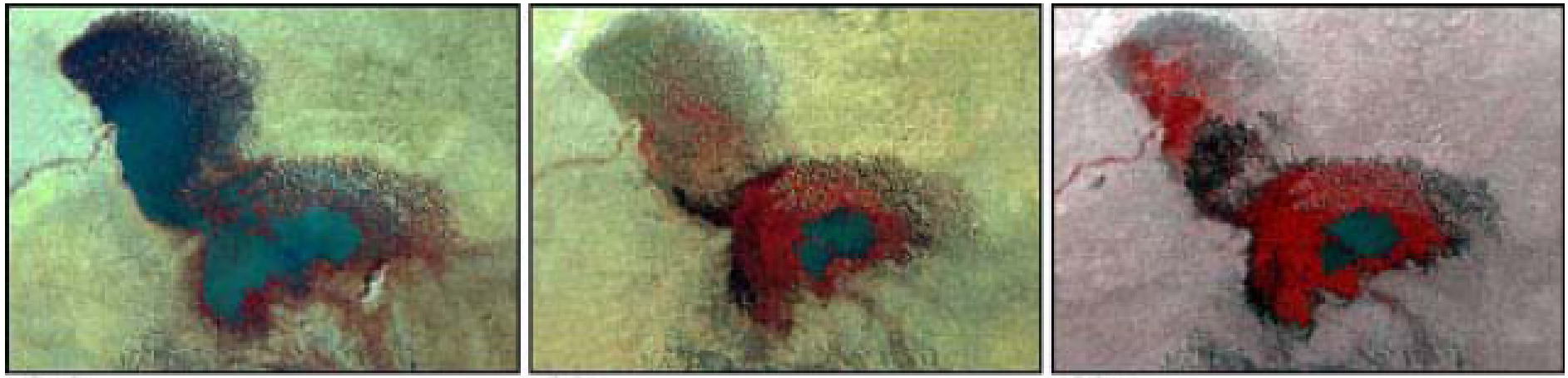
- What will happen to Africa as a result of climate change? What if global temperatures keep rising?

- One important issue is water scarcity, if temperatures rise and droughts become more common

Next topic: environmental and development

- What will happen to Africa as a result of climate change? What if global temperatures keep rising?
- One important issue is water scarcity, if temperatures rise and droughts become more common
- The case of Chad: Lake Chad, once the world's 6th largest lake, but it is drying up. It is currently only 10-20% of its former size. Former fishing towns are desert
- Desertification, plus damming of rivers for hydro-electric power, are both to blame

Africa's Disappearing Lake Chad



- For next time: study for the midterm exam!

Whiteboard #1

Whiteboard #2

Whiteboard #3

Whiteboard #4

Whiteboard #5


Map of Africa
TUNISIA
Mediterranean Sea
MOROCCO
IRAQ
IRAN
Canary Islands (SPAIN)
ALGERIA
LIBYA
EGYPT
Persian Gulf
WESTERN SAHARA
SAUDI ARABIA
MAURITANIA
MALI
NIGER
Red Sea
CHAD
ERITREA
SENEGAL
GAMBIA
Lake Chad
BURKINA
GUINEA BISSAU
GUINEA
SUDAN
DJIBOUTI
GHANA
BENIN
SOMALIA
SIERRA LEONE
IVORY COAST
Lake Volta
TOGO
NIGERIA
ETHIOPIA
LIBERIA
CENTRAL AFRICAN REPUBLIC
CAMEROON
Lake Rudolf
EQUATORIAL GUINEA
UGANDA
KENYA
SAO TOME & PRINCIPE
GABON
CONGO
ZAIRE
RWANDA
Lake Victoria
BURUNDI
TANZANIA
ANGOLA (Cabinda)
Lake Tanganyika
MALAWI
Lake Nyasa
ANGOLA
ZAMBIA
Lake Kariba
MOZAMBIQUE
MADAGASCAR
ZIMBABWE
NAMIBIA
BOTSWANA
SOUTH AFRICA (Walvis Bay)
SWAZILAND
LESOTHO
SOUTH AFRICA

Map of Africa