

I. In attendance

A. NAB

- 1) Paul Risser
- 2) Jim Macmahon
- 3) Bill Heal

B. EXEC

- 1) Waide
- 2) Gosz
- 3) Porter
- 4) Shaver
- 5) Robertson
- 6) Burke

C. NSF

- 1) Henry Gholz -DEB
- 2) Alice Leads - INT
- 3) ? - OPP
- 4) Gray
- 5) Phil Taylor - OCE

II. Introduction - R. Waide

A. see Waide Powerpoint for details (here focus on questions and discussion)

B. questions & comments

- 1) what was general feeling among sites about prioritization exercise?
 - a) lead PIs liked - would have liked to see it earlier
 - b) this was chance to step back from specific priorities to broader view of priorities
 - c) had strategic planning in past
- 2) is there any shift in the science questions?
 - a) much greater appreciation for synthesis
 - 1> network level questions
 - 2> science themes at CC meetings
 - b) also social sciences and information management
- 3) I would like to see the science more up front in White Paper (Heal)

C. Gosz

- 1) LTER Funding Process
- 2) comments
 - a) sites in first cohort rated synthesis etc. higher than later cohorts

D. LTER Network Goals

E. Burke Diagram

- 1) would be good to have International in figure
- 2) where is the network office?
 - a) hard to represent in this diagram
 - b) network office amplifies all of these arrows
 - 1> catalyst role
- 3) where does the money come for synthesis
 - a) both through sites and through network office
- 4) how do you get scientists jazzed up about synthesis?
 - a) net office can only help jump start

- b) money to get people together vs money for peoples time
- c) Taylor: having money especially for synthesis helps motivate
 - start drawing in people especially interested in synthesis
 - (not all field scientists are interested in synthesis)
- 5) Synthesis is not necessarily generated best from site-oriented person - cultural jump - Site based culture may be emphasized in training at expense of synthesis
- 6) CC meeting themes have helped jump start activities that moved onto NCEAS etc.
- 7) may be limiting to deal with synthesis just within LTER
 - a) how do you incorporate LTER science in larger syntheses?
 - b) have taken advantage of NCEAS
 - c) cross site competition from NSF big help for some sorts of work
 - d) Committee on Scientific Initiatives - helping to identify questions
 - 1> composed of individuals with network
 - e) could have LTER project without a site
 - f) could buy sabbatical time for senior scientists to work on synthesis
- 8) diagram tends to be internal - may want to focus on external world and LTER's place in it
 - a) what science has changed
 - b) what has changed in outside world
 - 1> leveraging funds has changed
 - c) if LTER could reinvent self, what would it look like?
 - d) want to see LTER in broader world
 - 1> like old style business - designed all systems etc. Now outsource many things - import them
- 9) egg diagram of LTER
 - a) want to see what is outside not just inside egg
- 10) number of NSF programs involved in LTER
 - a) indication of breadth
 - b) have tried to work with other agencies etc. to encourage LTER
- 11) LTER sites have diverse links to outside world
 - a) don't go through LTER network
 - b) did not design network for most powerful cross sites - focus instead on best groups of scientists
- 12) Urban sites
 - a) got explicit within site focus that is broader than the rest of the network
 - b) Global change - all LTER sites have roles, but only one focusing on grain production!
- 13) outside view - LTER Network has been powerfully influential in developing networks - hidden, bonus outreach
- 14) each site is casting its own nets looking for new technologies and science
 - a) and then communicate back to other sites in network
- 15) helpful to do prioritization to prevent "mission creep"
- 16) could make less LTER-centric
 - a) interface between sites and outside world instead of NET
- 17) don't lose CROSS SITE EXPERIMENT
 - a) LIDET is only one that has really done that across network

b) LIDET was funded independently..... that's why not part of figure

1> LTER facilitates

18) can think of diagram as slice through "network of networks"

III. Priority Setting

A. See Waide Spreadsheet

B. discussion

1) what would it have looked like if non-LTER scientists had prioritized?

a) they would not have understood most of this

b) we'd expect it to be pretty similar...

c) would be good to be able to say that other scientists also support

2) supplement funding has gone into optional areas

a) NSF role may be to expand areas

3) was there a sense of this is just and true or right - not surprising sites focused on sites

a) two components

1> site-centric

2> also trying to keep foundations of LTER science strong

4) strong keep money at sites view

a) except cryosphere and VCR had more emphasis on synthesis etc.

b) two highest money bids are for cross site and syntheses within biomes

c) how low can you get on international scale... may be due to phrasing of question aimed at ILTER network

1> want rationale for ILTER

5) only one category on list was suggested to drop.... want to do ALL these things, but some need additional money

a) SLTER good idea, but costly

b) talked a lot about human resources - PI and time that they have

1> new initiatives that require proposal writing tax that

6) takes time for some activities to get up to speed

7) ILTER

a) was most highly rated within its category

b) IGBP newsletter - most authors US

1> US is interested in international

8) diversity of sites leads to averages that may represent splits, not continuous distribution

9) has been general movement in these directions towards synthesis etc.

a) would have been very different 5 years ago!

10) perhaps interesting to do survey repeatedly over years.....

IV. Rules of Thumb

A. Discussion

1) some disagreement on what goes in what ovals

2) some programs are "gifts that eat"

a) ILTER, SLTER

3) this is only from site point of view

4) some would continue if funding were cut

a) ILTER would go on driven by science

b) ILTER is science-led

5) some have real potential whereas others are more modest

- 6) priorities are not just internal to LTER
- 7) how often is tail wagging dog?
 - a) coming to grips with expanding efforts in cross site etc.
 - b) how do you strengthen existing areas
 - 1> dueling priorities
- B. question to NAB = are we headed in right direction with respect to prioritization
 - 1) good work, important to have had input from sites
 - a) what is missing is what is on top of activities... what are we really trying to accomplish? Scientific record - 20 key ideas
 - 1> could go to NSF and say these are the key questions we want to address
 - 2> understanding long term processes -> sound decision making
 - b) need to have that larger scale filter - sets larger priorities
 - 2) one of problems with goals is that statement of scientific goals are too vague
 - 3) looking for the word "strategy"
 - a) some goals are science goals, some are not
 - b) but need strategy for achieving
 - c) want key things at top to be science goals
 - 1> pattern and control primary production etc.
 - 2> core areas
 - d) need to rise above mechanisms (e.g. data sharing, training) and focus on larger goals
 - 4) first draft of white paper had more of those general science goals....
 - 5) should we have goals other than science goals?
 - a) e.g., education and training
 - 6) revealing that from the NSF site review standpoint, there are explicit categories that sites are reviewed on that are not based on the science per se.
 - a) NSF views them as important
 - 7) past questions have proven far sighted - original questions of LTER are now central to field
 - 8) really are three steps
 - a) what are science goals for LTER
 - 1> also non-science goals
 - b) strategies (are we going at it right way?)
 - 1> are we using best strategies
 - c) activities
 - 1> have been focusing on these.....
 - 9) need paragraph or two on pure science goals
 - a) only one LTER pulls parts together
 - 10) strategies - may need to be reexamined
 - 11) this may be best dealt with through external review committee.... different than having current set of LTER PIs think of strategies
 - a) could evolve from folks involved in network
 - 12) we can devise strategies, but they may or may not come to pass
 - a) NSF needs to be engaged
 - 13) confused about how much we want to try to describe what NSF

should be

14) strategies need to focus on what is do-able

15) may want to reexamine science goals

a) biological diversity

b) carbon and nitrogen balance in terms of PP

16) you may want to change phrasing to make sure that they sound updated

a) build on what we have learned

17) need to sell "what is just and true and right" to NSF

18) to some degree LTER group is wrong group to ask (they are selected group) - perhaps need broader group (NAB?)

19) have added spatial component after 10 years

a) core areas were a way of guaranteeing broad perspectives within sites

1> ways sites can talk to one another

20) what are unique components of LTER?

a) not information management, not training

21) need holistic approach to understanding how a place works

a) lets you address lots of hot topics as they heat up

22) only 6 sites go back 20 years....

a) should different cohorts of sites be taking different approaches?

23) five core areas make sure you address the major components of systems

a) whether they are formal or not, we must address core areas to understand system

24) core topics omit one species - humans

a) this has been fundamental shift

b) many of sites have human as integral part of system

c) ecosystem concept has expanded to include humans

V. Drafted response to NAB recommendations - do we need to discuss responses

A. report did a good job of responding... (some later rather than earlier)

B. fine, clear that you did not respond that quickly, but that is to be expected

C. we have touched on range of things... need to pick up key things

1) have covered the package

D. discussion

1) after 20 years, still look at time and space, but need to modify to show what you have learned in 20 years - refinement of what you have learned

a) not same-old same-old

2) clear things have emerged

3) can add in human elements

a) full spectrum of human interactions

1> McMurdo to Baltimore

4) how would we reorganize LTER given insights.....

5) genetically modified organisms in environment

6) did have reevaluation of core areas several years ago

a) lots of things that could be added

7) original LTER focused on long term, ecosystem alone

a) added spatial at 10 year

- b) what has been added now? Gradient of human interactions
 - 8) history of augmentations - most sites don't have way to support human interactions research
 - 9) supplements and SLTER - have been treated like core, but could go away
 - 10) yes LTER started with LT, and Ecosystem (E), but concept of Ecosystem has expanded
 - a) human influences on PP
 - b) but also PP effects on society
 - c) modified feedback effects
 - 1> adaptive feedbacks of humans
 - 11) as outsider to LTER, its pretty obvious that it is an animal that has changed - moved beyond parochial goals
 - a) have not heard much talk about synthesis and how it will be achieved
 - 1> don't synthesize over long term
 - 2> need targeted questions
 - b) can think of questions in terms of what you want to synthesize
 - 12) species effect and biodiversity effects with humans as viewpoints
 - 13) breakthrough in ecology has been on focusing on pristine vs influenced systems
 - 14) LTER could help to influence directions
 - a) we have all watched many wagons roll by
 - 15) Major initiatives
 - a) scientific community moving more towards systems thinking
 - b) LTER network ideally positioned for looking at gradients
 - 16) LTER has been doing system science from day 1, but perception of system has expanded
 - a) IGBP was also doing it, but blindly without conceptual thinking built in....
 - 17) systems thinking has evolved
 - a) moved beyond biogeochemistry
 - b) for synthesis we come up with themes each year
 - 1> regardless of theme, every site can contribute
 - 18) strategy should state that you will apply themes from ecological systems analysis
 - 19) you've had expansions within sites - long term ecological - not just ecosystem (C and N moves) - deal with biodiversity (but not population ecology at forefront of LTER)
 - 20) double edged sword of diversity
 - a) wide array of questions vs standard data
 - 21) example - in science article wet side had more to do than dry side - unexpected result
 - a) good example of refining
- E. Indy does a table of Ecological Science and Policy Enterprise
- 1) how does the enterprise work globally?
 - 2) what is our strategy for the specific role and contribution of LTER that is unique
 - 3) new diagram
 - 4) key science areas
 - a) interactions of ecosystems with climatic change

- b) controls over biological diversity, interactions with ecosystem functioning
- c) sustainability of natural resource systems (land use)
- d) human interactions and biogeochemical cycles
- 5) general strategy
 - a) focus on long term behavior
 - b) use network to achieve Generalizations
 - c) provide model of long term, networked science
 - d) diversity among sites to capitalize on individual site/scientist strengths
- 6) discussion
 - a) first two of strategies are science
 - 1> other 2 are how you get there
 - b) service activities are focused on longer perspective for achieving science
 - c) Risser - you have it pretty much right
 - 1> hard to talk about advances if core areas are described same way
 - 2> key to describe how core areas continue to allow us to address key issues
 - þ> approach links to future
 - d) need to make clear that long term does not mean out of date!
 - e) core measurements as ecological indicators
 - f) site based - harder to define boundaries than for systems (e.g. arctic) - would like clarification of systems we are dealing with....
 - g) caution against Ecosystems in favor of Ecological Systems
 - 1> different connotations
 - h) evolution over last two decades
 - 1> jump to spatial
 - 2> anthropogenic
 - 3> land margin
 - i) have had something relevant to say regarding changing questions using long term data
 - j) pet peeve - land use change is faster and more pervasive than climate change

VI. How we are preparing for 20-year Review

A. Gosz

- 1) morning's discussion was useful
- 2) review of 10-year report & Franklin response
- 3) approaches - from 10-year review
- 4) comments & discussion
 - a) need to address standardization issues
 - 1> harmonization examples
 - þ> science paper
 - b) similarity of messages derived from site science
 - c) holistic may have too much connotational loading (been around a long time)- broader view, not more holistic
 - d) ecological, not ecosystems - sites have community ecology etc.
 - 1> funding for LTER in eyes of current program officers is IBP money - ties to ecosystems. Often lump Ecosystems and LTER budgets
 - 2> need to emphasize that this is not an ecosystem program

- 3> broaden disciplines involved in LTER science
- e) Long Term shorthand for a number of science themes
 - 1> short term doesn't show long term effects
 - 2> compounded interactive effects
 - 3> need to present why we need long term research
 - 4> indirect effects
 - 5> extreme events
- f) see Gosz list of 1st and 2nd decade emphases and changes
- g) may want to recognize sources of some themes (external for global change) vs internal (role of events)
- h) nature of LTER has allowed it to prepare for opportunities, initiatives
 - 1> potential achilles heal in terms of keeping focus
- i) suggest doing the third decade
 - 1> tend to subsume what has gone before.....
- j) how sites have decided what measurements to drop etc.
 - 1> iterative process responding to new knowledge
- k) systems are a lot more dynamic than we anticipated them to be
 - 1> "long term is longer (and more painful) than we thought" - R. Waide
- l) scaling - fast and slow variables, in LTER and GC program has led to new and interesting thinking regarding interactions between variables at different scales.
 - Anticipate new theoretical constructs (not same as scaling) that LTER will be critical in addresssing.
- m) most sites have extended time frame through paleo, land use history etc.
- n) also extended into regional
- o) in third decade, low probability, high consequence will come up more
 - 1> invaisives
 - 2> genetic crops etc.
 - 3> they are going to happen.... need to be ready
- p) LTER vulnerable to attack when you scale up in space
 - 1> totally biased sample
 - 2> way round that is to go for extensive suite of sites to complement intensive suite
 - p> some regulatory agencies have done (or tried)
 - 3> can generalize in terms of KNOWLEDGE even if can't generalize in area of data
- q) LTER has done some great regionalization - but we are not the only ones in that game
 - 1> in LIDET describe response surface in relation to environment (not in relation to space)
 - p> critical gradients are moisture, temperature etc.
 - 2> fundemental process-oriented synthesis
- 5) 17 possible questions
 - a) discussion
 - 1> 1,2,4,5 carry most weight
 - p> may want to collapse or reduce more mechanistic
 - p> keep hitting the science drum!
 - 2> need to do a good job on the science - showing how important ideas originated through LTER science

þ> tendency to not focus on science, but effectiveness of organization

a: want to keep link to science

þ> don't want to describe insufficiencies in terms of actions of others. Focus on what we are able to do. Proactive

3> comment LTERs real strength is in its basic science.... which has proved its worth

þ> hard to separate from infrastructure, since so much of new science depends on that infrastructure

þ> solid science is still key to getting proposal funded

4> would be good to have overall LTER program hits

VII. what would you do differently if designing network?

A. more sites

B. better design for examining gradients based on questions

C. could have prescribed suite of measurements

D. could be very focused

E. may need new model in order to get additional funding

F. surgical expansion of sites

1) based on disturbance

2) winter rains

3) severity of climate

G. network has been driven by bottom up

H. could look along gradients

1) but is that too specific

I. would be good to have a suite of common measurements that really are done the same thing in the same way

1) or at least interconvertable

J. to achieve standardization, need to give up some things that are good themselves

1) loss of creativity vs standards

K. could use cross site studies

L. satellite sites would help

M. need combination of requiring some common things and complement that with freedom for innovative science

1) International emulation because they see value in the model

N. sites have investment incentive

O. examples of good cross site

1) LIDET

a) started at LTER

b) under separate grant

2) LYNX

a) comparison of N processing in streams. 2/3 sites are LTER sites

b) investigator initiative but built on LTER foundation

P. can use satellite sites to fill in gaps

Q. some top down systems have been disasters....

R. sites history important

1) but LTER mentality important