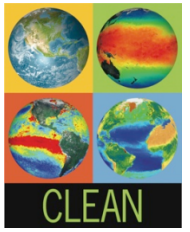
CLIMATE LITERACY AND ENERGY AWARENESS NETWORK PROJECT

Developing an online reviewed collection of digital learning resources

Susan Buhr Sullivan, CIRES

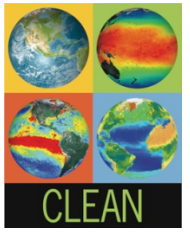
MRSEC Meeting, 9/16/2013 Santa Barbara,

Why online collections?



- Access to most recent science (fast changing fields)
- Incorporating real data
- Quick turn around
- Easy search
- Different resource types to augment instruction

CLEAN Collection



- Educational resources for grades 6-16 on climate, climate change and energy topics (583 as of 9/14/13)
- Resources scientifically/pedagogically peer-reviewed
- Annotations reflect reviewer comments
- Alignments
  - Climate Literacy Principles / Energy Literacy Principles
  - National Science Education Standards
  - AAAS Project 2061Benchmarks for Science Literacy
  - Quantitative Skills / Regional focus
  - TBD: NGSS DCI, practices, cross-cutting concepts

Climate Literacy & Energy Awareness Network (CLEAN) collection

TERC

CIRES
Cooperative Institute for Research in Environmental Sciences

NSDL
THE NATIONAL SCIENCE DIGITAL LIBRARY

SERC the Science Education Resource Center at Carleton College

COLORADOSCHOOLOFMINES
EARTH • ENERGY • ENVIRONMENT

- NSF- Climate Change Education Program
- NOAA Core Funding, syndicated at climate.gov
- Long Term Ecological Research sites
- Dept of Energy

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

NSF

Your charge as I understand it

- Inventory existing materials sciences learning resources
- Includes learning resources, professional development and camps
- Resources held primarily through MRSEC
- No community-based literacy framework
- Identifying and tagging high-quality resources is a value.

- What have I missed?

What do educators tell you?

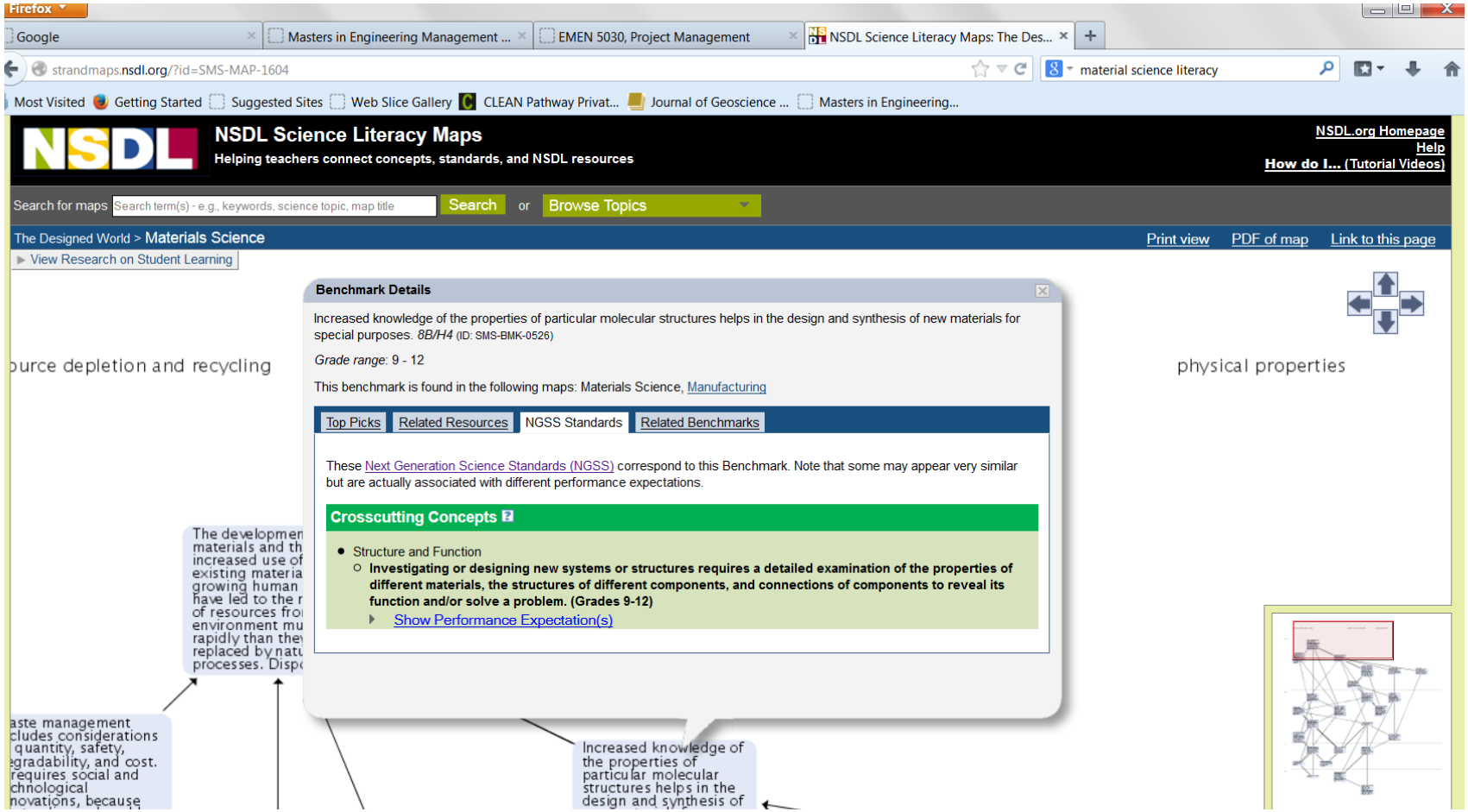
- Alignment with standards
- Perceived level of topic compared with student knowledge
- Need for professional development
- Student engagement and interest-high?
- Access to resources

Reported barriers to educators to teaching climate:

- Lack of high-quality resources
- Lack of professional development/personal knowledge
- Controversy of topic
- Alignment with Standards

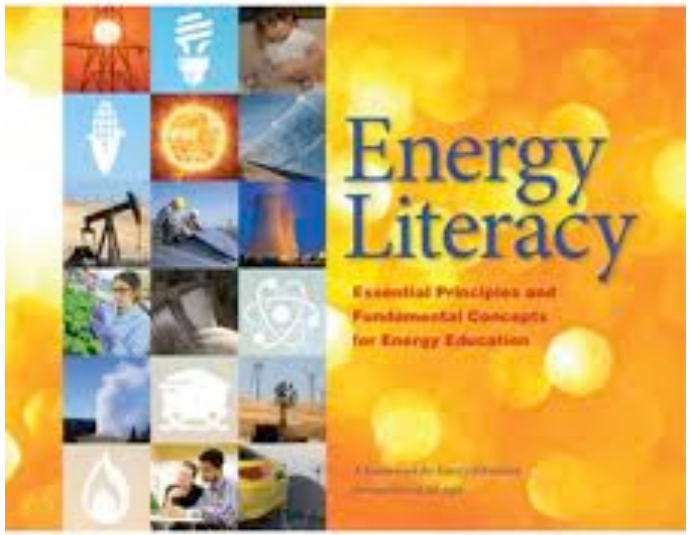
Inverness Research, 2012
N=196

New opportunities: Next Generation Science Standards



Getting started: Scope of collection

- Climate Literacy: Essential Principles of Climate Science
- Energy Literacy: Essential Principles of Energy Education



Web tour

- Browse resources
- Refine results
- Annotation
  - Scientific
  - Pedagogical
  - Ease of use
  - Teaching Tips
  - Expert science
- Jump to Activity

Educational Resources: Search the CLEAN Collection

Scientifically and pedagogically reviewed digital resources for teaching about climate science, climate change, and energy awareness

search

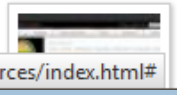
Help

Results 1 - 10 of **344 matches**

Paleoclimates and Pollen
http://www.ucar.edu/learn/1_2_2_10t.htm
In this activity, students examine pictures of pollen grains representing several species that show the structural differences that scientists use for identification. Students analyze model soil ...

Seasonal Change on Land and Water
http://www.globe.gov/documents/356823/356868/earth_la_se...
In this worksheet-based activity, students review global visualizations of incoming sunlight and surface temperature and discuss seasonal change. Students use the visualizations to support inquiry on ...

How a Geothermal Power Plant Works
http://www1.eere.energy.gov/geothermal/gpp_animation.html
This simplified animation of a geothermal power plant from the U.S. Department of Energy illustrates commonalities with traditional power-generating stations. While there are many types of geothermal ...



Stabilization Wedges Game
http://cmi.princeton.edu/wedges/game.php
This is a team-based activity that teaches students about the scale of the

sources/index.html#

Refine the Results

Resource Type

- Activity 186 matches
- Short Demonstration/Experiment 4 matches
- Visualization 58 matches
- Video 95 matches
- Other 2 matches

Climate and Energy Topics

- Climate System 135 matches
- Causes of Climate Change 77 matches
- Measuring and Modeling Climate 138 matches
- Impacts of Climate Change 127 matches
- Human Responses to Climate Change 60 matches
- Nature of Climate Science 16 matches
- Energy Use 95 matches

Grade Level

- Intermediate (3-5) 13 matches
- Middle (6-8) 243 matches
- High School (9-12) 297 matches
- College Lower (13-14) 171 matches
- College Upper (15-16) 60 matches
- Graduate/Professional 9 matches

CLEAN

CLIMATE LITERACY & ENERGY AWARENESS NETWORK

Signs of Change: Studying Tree Rings

http://www.climatechangenorth.ca/section-LP/LP_28_HI_M_nancy.html

Nancy Colberg, Northern Climate Change

In this hands-on activity, students will learn about dendrochronology (the study of tree rings to understand ecological conditions in the recent past) and come up with conclusions as to what possible climatic conditions might affect tree growth in their region. Students determine the average age of the trees in their schoolyard, investigate any years of poor growth, and draw conclusions about the reasons for the years of poor growth.

Activity takes about 2-3 hours. Tree disks or cores are needed and ideally one microscope.

Learn more about Teaching Climate Literacy and Energy Awareness

Notes From Our Reviewers

The CLEAN collection is hand-picked and rigorously reviewed for scientific accuracy and classroom effectiveness. Read what our review team had to say about this resource below or learn more about how CLEAN reviews teaching materials

Teaching Tips | Science | Pedagogy | Technical Details

Teaching Tips

- If the suggested path of obtaining the tree samples is too complicated - go to a saw mill and ask them to cut tree disks or cut some of your own from a tree trunk.
- Educators should assign the extension on solutions to the students at the end of the lesson.
- If a coring borer is used – measure the diameter of the tree to determine how deep to core the tree.
- Obtaining local weather records for seasonal average rainfall and temperatures would provide a basis of

Topics

Proxy Data
See more on this topic.

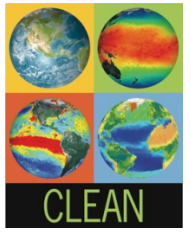
Grade Level

Middle (6-8)
See more at this grade level.

High School (9-12)
See more at this grade level.

Activity can be modified to be used with high school students.

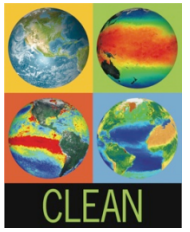
Reviewing online educational resources



- Online resources historically not subject to rigorous, formal, valid review
- Additional considerations in review (e.g. multi-media elements, navigation, data access)
- Additional dimensions (interactive learning, data manipulation etc.)

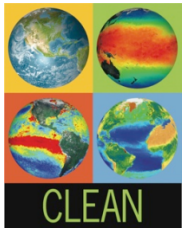
> Reviewers need wider methodological expertise than journal article reviewers

Existing educational review models



- Review models
  - Peer-review (Merlot, NASA product review, CLEAN)
  - Editorial Board Review (NSDL-Pathways)
  - Community review system (DLESE)
  - User review (Merlot)
- Issues
  - Time-consuming
  - Commitment by developer
  - Scaling to large collection
  - Many experts needed

What is an excellent resource?



Science

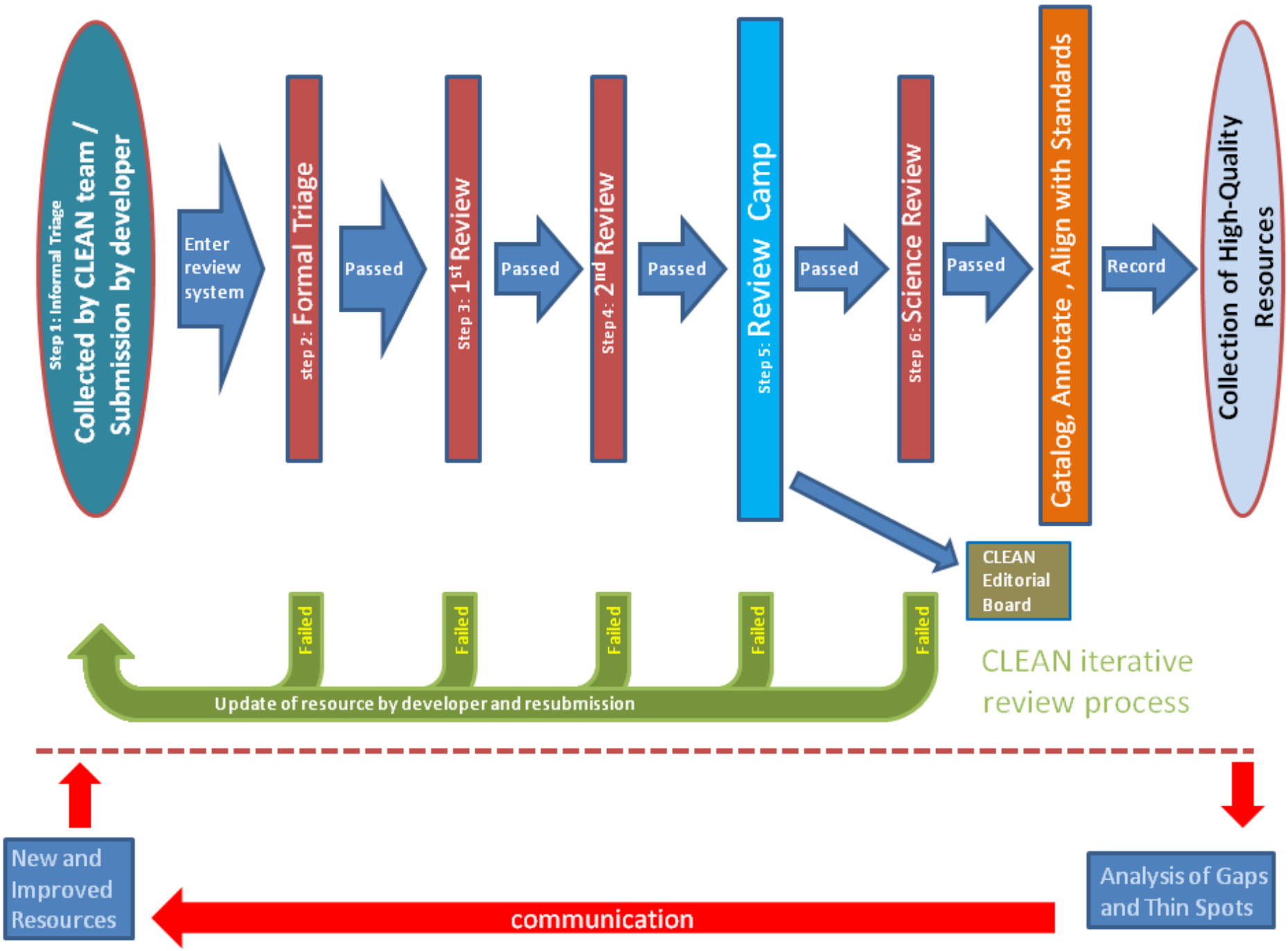
- Addresses at least one of Climate or Energy Literacy Principles
- Solid, current science
- Original data cited, and from a quality source

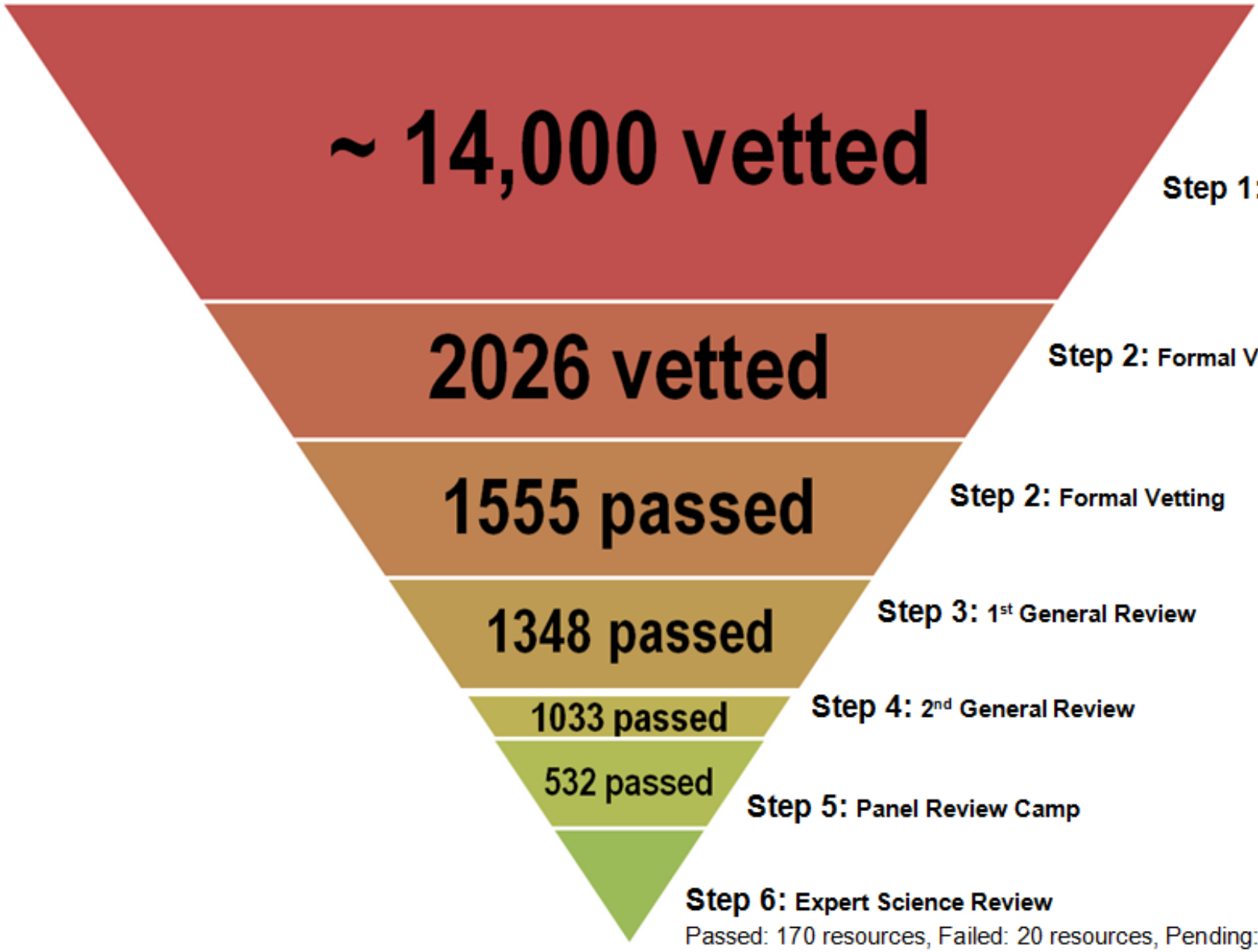
Pedagogy

- Appropriate to target age group
- Requires students to do independent/inquiry thinking, not just follow a recipe
- Accommodates diverse learners (learning styles, language issues, cultural diversity)

Ease of use

- Engaging in subject and approach
- Stands on its own – doesn't depend on related modules, lessons, etc.
- Offers comprehensive guide to the resource for instructor (activities)
- Uses software/tools/resources generally found in classroom or free to download
- Digitally accessible resource

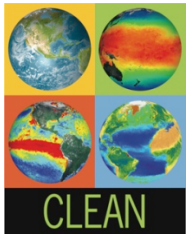

Step 1: Informal Triage
Collected by CLEAN team / Submission by developer
Enter review system
step 2: Formal Triage
Passed
Step 3: 1st Review
Passed
Step 4: 2nd Review
Passed
Step 5: Review Camp
Passed
Step 6: Science Review
Passed
Catalog, Annotate , Align with Standards
Record
Collection of High-Quality Resources
CLEAN Editorial Board
Failed
Failed
Failed
Failed
Failed
Update of resource by developer and resubmission
CLEAN iterative review process
New and Improved Resources
communication
Analysis of Gaps and Thin Spots



Step 6: Expert Science Review

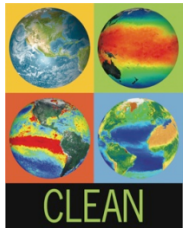
Passed: 170 resources, Failed: 20 resources, Pending: 342 resources
(Pending editorial board review: additional 107 resources)

Collection Management



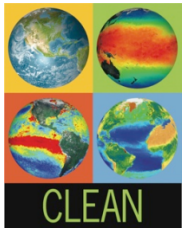
- Review Team – collects, reviews materials
- External Reviewers – recruiting and training for panel reviews (face-to-face, virtual)
- Science Reviewers – individual matching of expertise
- Cataloging Team – alignments, vocabulary, quality control
- Technical Team – website support
- Project Management Team

Developing Review Criteria



- Review criteria specific to resource type
- Test reviews: good agreement for good resources, wide spread in answers for low quality resources
- Informed by NSDL and SERC guidelines, Merlot criteria, DLESE, Climate Change collection scorecard
- Review of e-learning materials requires additional considerations (multi-media elements, navigation etc.)

Review 1-4: questionnaire



- Triage (collection scope, resource type)
- General Review
  - Scientific accuracy
  - Pedagogic effectiveness
  - Technical quality / Ease of use

  → 6-12 questions for each category, overall rating in rubric format, comment box for annotations

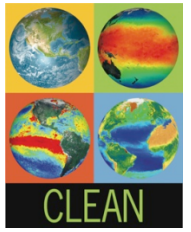
  → Questions help consider all relevant aspects > lead to overall rating

  → No quantitative, only qualitative recommendation (low – medium – high priority)

Review 5: Panel review

- Based on NSF-panel review system
- Panel: educators, scientists (necessary range of expertise)
- Teams of 4 review educational resource based on prior reviews, final decision about inclusion in collection
- Comments of reviewers are compiled into annotation including teaching tips
- Panels held face-to-face or virtually

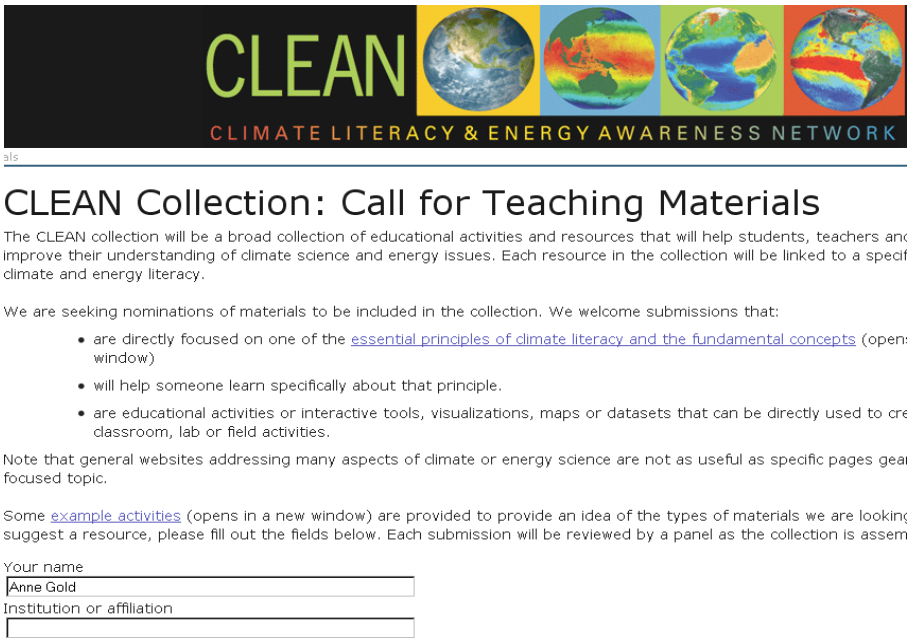
Review 6: Expert Science Review



- External expert with PhD in relevant field reviews scientific quality and accuracy of resource
- Use Customer Relations Management techniques to make expert review efficient
- Challenges
  - Grade-level appropriate science
  - Recruiting scientists
- Results: August 2013
  - 21 total
  - 9 excellent/5 sound/4 needs clarification/3 fails

Avenues into Collection

- Online search by CLEAN reviewer
- Targeted after gap analysis
- Suggestion through public form
- Submission by developer (iterative review, partners)



CLEAN

CLIMATE LITERACY & ENERGY AWARENESS NETWORK

als

CLEAN Collection: Call for Teaching Materials

The CLEAN collection will be a broad collection of educational activities and resources that will help students, teachers and improve their understanding of climate science and energy issues. Each resource in the collection will be linked to a specif climate and energy literacy.

We are seeking nominations of materials to be included in the collection. We welcome submissions that:

- are directly focused on one of the essential principles of climate literacy and the fundamental concepts (opens window)
- will help someone learn specifically about that principle.
- are educational activities or interactive tools, visualizations, maps or datasets that can be directly used to cre classroom, lab or field activities.

Note that general websites addressing many aspects of climate or energy science are not as useful as specific pages gear focused topic.

Some example activities (opens in a new window) are provided to provide an idea of the types of materials we are looking suggest a resource, please fill out the fields below. Each submission will be reviewed by a panel as the collection is assem

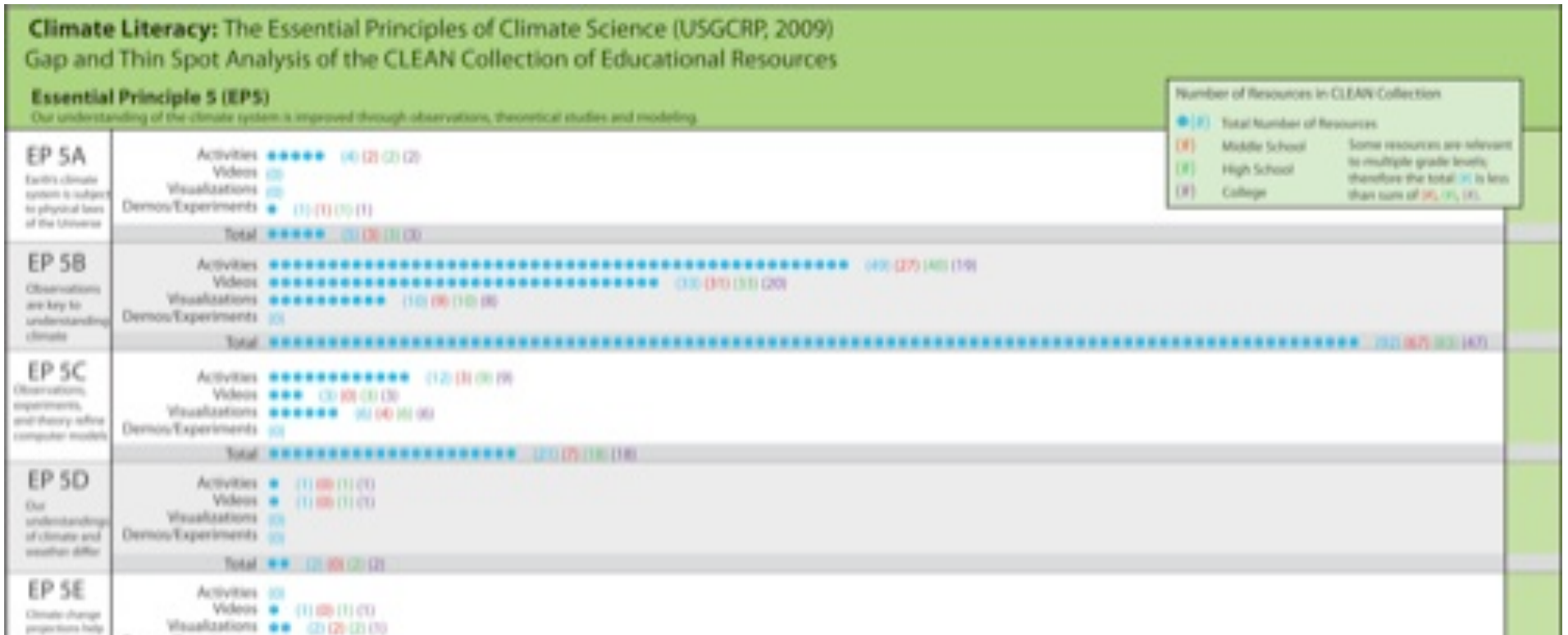
Your name

Anne Gold

Institution or affiliation

Gap & Thin Spot Analysis

- Defined collection scope (Literacy principles, vocabularies) allow gap analysis
- Informs resource collector team as well as resource developers



CLEAN Pathway Review

csv dump of these records

This is the review pool for the CLEAN project. Items enter the review pool through either the

- Public Submission Page or
- Resource Collector Submission Page

search

Help

Sort by: Best Match Descending sort

Id Search

go to Catalog

Results 1 - 10 of **2163 matches**

7	View Edit **http://www.climate.gov/**						
	1 Submitted by a Resource Collector	2 Chris Comer	3 Holding-Too Large (course, curricula)	4 Unreviewed	5 Not Screened or Assigned	6 Unreviewed	7 Not Reviewed by Scientist
	8 No Annotations	9 Unassigned	10 Not Yet Reviewed	11 Uncataloged	12 Not Accepted	13 Developer not contacted	14 No Editorial Review Needed
8	View Edit **http://serc.carleton.edu/eet/globe/index.html** Using GLOBE Data to Study the Earth System						
	1 Submitted by a Resource Collector	2 Marian Grogran	3 Highly Recommended for Review	4 High Priority	5 Accepted: Second Round Reviewers Assigned	6 Medium Priority	7 Not Reviewed by Scientist
	8 Initial Annotations Complete	9 Unassigned	10 Requires Further Review by Editorial Team: Annotations Complete	11 Cataloging Complete -Expert Science Review Pending	12 Not Accepted	13 Developer not contacted	14 Passed into Collection
10	View Edit **http://serc.carleton.edu/eet/envisioningclimatechange/index.html** Envisioning Climate Change Using a Global Climate Model						
	1 Submitted by a Resource Collector	2 Marian Grogran	3 Highly Recommended for Review	4 High Priority	5 Accepted: Second Round Reviewers Assigned	6 High Priority	7 Passed Scientist Review as Excellent
	8 Initial Annotations Complete	9 Unassigned	10 Passed Review: Annotations Complete	11 Cataloging Complete	12 Accepted	13 Developer contacted: waiting for response	14 No Editorial Review Needed

Refine the Results

Review Cycle

- Round 1 Review (early 2010) 282 matches
- Round 2 Review (late 2010) 521 matches
- Round 3 Review (spring 2011) 657 matches
- Round 4 Review (late 2011) 333 matches
- Round 5 Review (summer 2012) 209 matches
- Round 6 Review (fall 2012) 12 matches
- Not Part of Review Cycle 212 matches

Assigned Collector

- Unassigned 21 matches
- Britt Aragow 34 matches
- Monica Bruckner 67 matches
- Scott Carley 374 matches
- Chris Comer 61 matches
- Candace Dunlap 173 matches
- Anne Gold 315 matches
- Marian Grogan 111 matches
- Cynthia Howell 3 matches
- Rebecca Katsh Singer 91 matches
- Karin Kirk 30 matches
- Jeffery Lockwood 453 matches
- Cheryl Manning 36 matches
- Mark McCaffrey 53 matches
- Kristin Record 192 matches
- Richard Shin 18 matches
- Beth Simmons 140 matches

Initial Vetting

- Highly Recommended for Review 810 matches
- Recommended for Review 745 matches
- Holding 258 matches

Delete

CLEAN Pathway Review

All Review Items > http://youngvoicesonclimatechange.com/movie_plant-for-the-planet.php

Plant for the Planet

1866 **http://youngvoicesonclimatechange.com/movie_plant-for-the-planet.php** view in new window view catalog record

Edit URL/Title

Step 1: **Item Added to Review Pool**
Submitted by a Resource Collector

Step 2: **Assign to Resource Collector**
Beth Simmons

Step 3: **Initial Vetting by Resource Collector**
Recommended for Review

Step 4: **Initial RC Review**
High Priority

Step 5: **Accept for Camp and Assign Secondary Reviewers**
Accepted: Second Round Reviewers Assigned

Step 6: **Second Round Review**
Medium Priority

Step 7: **Science Review**
Not Reviewed by Scientist

Step 8: **Annotation**
Initial Annotations Complete

Vocabs

Resource Type:
Audio/Visual:Animations/Video

Hide

- Activities
  - Problem Set
  - Classroom Activity
    - Short Activity
      - Socratic Questioning
      - ConcepTests
      - Think-Pair-Share
      - Demonstration
      - Clicker Question
    - Jigsaw
    - Gallery Walk
    - Studio Teaching
    - Just in Time Teaching
    - Process Oriented Guided Inquiry
  - Lab Activity
  - Project
    - Investigative Case Studies
    - Independent Research
    - Service Learning
  - Field Activity
    - Field trip

SERC Content Management System

Log Out

Science Education Resource Center @ Carleton College

Sites/Projects | My Account | Manage | Cataloging | Documentation

« Search All View in New Window: This URL -- Public View of this Record -- This Record as Plain Text -- Cataloging Help

Jump to Different Master Id « Previous Next »

Plant for the Planet

http://youngvoicesonclimatechange.com/movie_plant-for-the-planet.php

▶ edit url

Title

Plant for the Planet

Description

This video describes the foundation Plant for the Planet, a foundation created by a 9-year-old German boy, Felix. This foundation has planted more than 500,000 trees in Germany, which he says help sequester carbon and reduce greenhouse gas emissions. The student rallies, first his community and then other children, to plant millions of trees to offset our energy-use emissions.

Short_description

Keywords

Comma separated list of terms and phrases

Annotations

Save All Changes >

About Record 43160

This record is derived (at least in part) from external catalog sources.

State: Available
▶ more info

Sharable: Share
▶ more info

Locally Reviewed/QA'd: Yes
▶ more info

Unvetted External: no
▶ more info

Record Needs Work: No
▶ more info

Last Editor: Sarah Hill

Last Edit Date: 2012-09-06 13:22:20

Date Created: 2012-01-05 15:22:49

Project Responsible:

CLEAN

Catalogers' Notes

Imported from review system, review item 1866 January 5, 2012, 3:22 pm.

Master Catalog Id: 43160 -- Internal Catalog Id: 21584

CLEAN

CLIMATE LITERACY & ENERGY AWARENESS NETWORK

Plant for the Planet

http://youngvoicesonclimatechange.com/movie_plant-for-the-planet.php

Young Voices on Climate Change

This video describes the foundation Plant for the Planet, a foundation created by a 9-year-old German boy, Felix. This foundation has planted more than 500,000 trees in Germany, which he says help sequester carbon and reduce greenhouse gas emissions. The student rallies, first his community and then other children, to plant millions of trees to offset our energy-use emissions.

Video length 5:38 min.

Discuss this Resource»

Learn more about Teaching Climate Literacy and Energy Awareness»

Notes From Our Reviewers

The CLEAN collection is hand-picked and rigorously reviewed for scientific accuracy and classroom effectiveness. Read what our review team had to say about this resource below or learn more about how CLEAN reviews teaching materials

Teaching Tips | Science | Pedagogy | Technical Details

Teaching Tips

- Plant for the Planet program could be used within a classroom to inspire students to make changes by witnessing what other students are doing around the world. Oftentimes individuals don't know what to do to help make a difference.
- Teachers could utilize this video in a motivational context or as an example of ways in which individuals can make a difference in organizing community projects.

About the Science

- Through this video, students can witness other students making a difference and actively addressing climate issues. Planting trees may or may not be an effective carbon sequestration strategy – science seems to be changing on this.

Topics

Sources and Sinks
See more on this topic.

Mitigation Strategies
See more on this topic.

Personal Responsibility
See more on this topic.

Human Responses to Climate Change
See more on this topic.

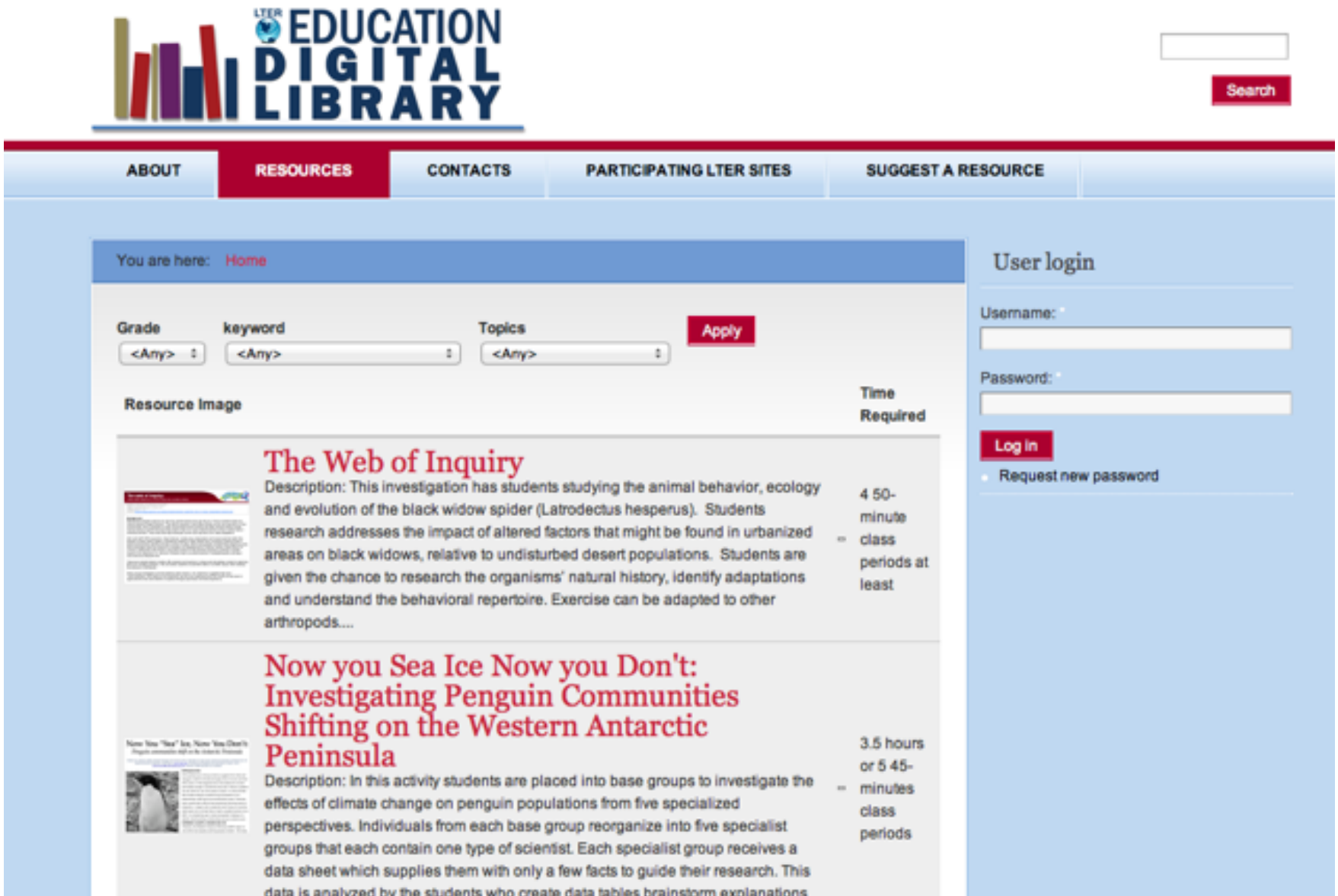
Energy Use
See more on this topic.

Grade Level

Middle (6-8)
See more at this grade level.

High School (9-12)
See more at this grade level.

Partnering with CLEAN: Long Term Ecological Research (LTER)



Different goals

- LTER ($12K)
  - Goal: LTER Community Collection, some CLEAN resources
  - Inputs: Lots of resources, 21 through CLEAN camp, 12 in CLEAN
  - Limits: Resources not built for classroom, scope
- Department of Energy ($38K)
  - Goal: CLEAN resources
  - Inputs: Hundreds of energy resources, DOE reviewers, energy literacy community
  - Outputs: ~ 80-90 new CLEAN resources

Next steps for MRSEC?

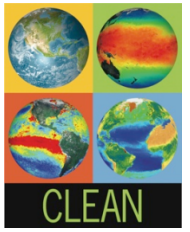
- Scope statement
- Pools of resources
- Collaborative funding, like LTER?
- Reviewers for camp
- Contacts for iteration

Questions?

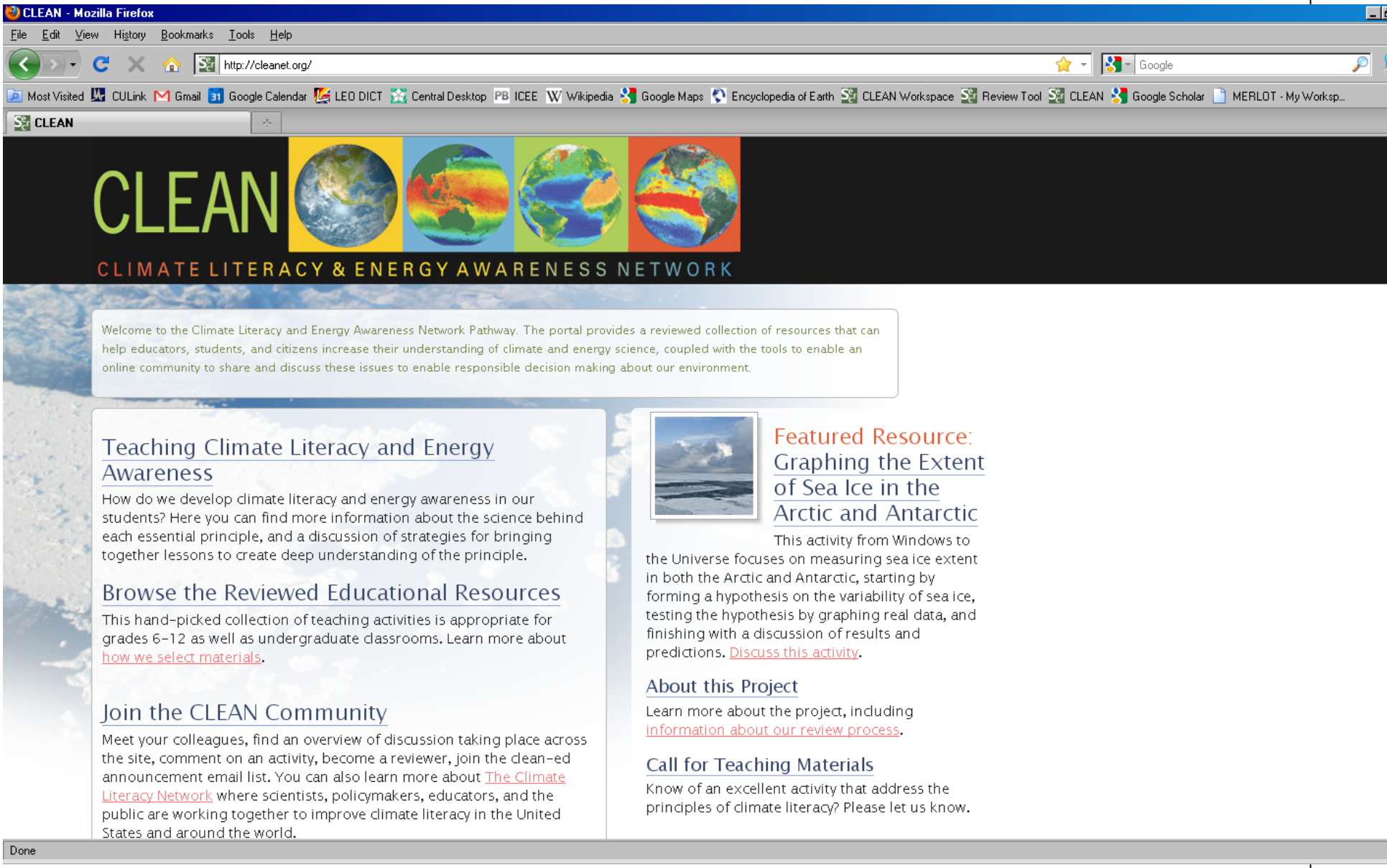
Contact

- Susan Buhr Sullivan, susan.buhr@Colorado.edu, 303-492-5657
- Anne Gold, anne.u.gold@Colorado.edu
- Tamara Ledley, tamara_ledley@terc.edu
- Cathy Manduca, cmanduca@carleton.edu

Summary



- Collection supports educators (search options, alignments, annotations)
- Rigorous and transparent review process
- Ensures reliable and high-quality resources
- Framework of Climate and Energy Literacy Principles allow for collection gap analysis



CLEAN collection: www.cleanet.org