

Sustainable Agriculture Matrix Internship at Definitive Logic at UMCES Appalachian Laboratory



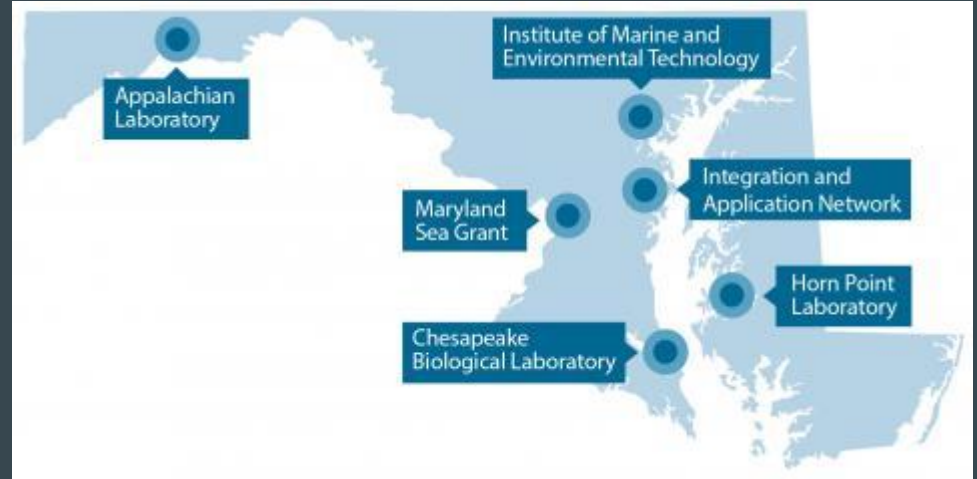
Jacob Thornton

University of Maryland Center for Environmental Science: Appalachian Laboratory

- The University of Maryland Center for Environmental Science aims toward better management of Maryland's natural resources and the protection and restoration of the Chesapeake Bay.
- Their efforts are accomplished through:
 - Public service
 - Key leader in Chesapeake Bay efforts.
 - Research
 - Education
 - The University of Maryland Center for Environmental Science is one of 12 universities in the University System of Maryland.

The Appalachian Laboratory

- Founded in Frostburg Maryland in 1962.
- Creates emphasis on Western Maryland & the Appalachian region while continuing research all over the world.
- Scientists advise state, national, and international leaders on:
 - Air & water quality
 - Wildlife management
 - Forest & agricultural management
 - Biodiversity conservation



Team

- Dr. Zhang
 - Associate professor for UMCES
- Kevin Jackson
 - Lab member at UMCES
- Dr. Tu
 - Salisbury University professor

Nitrogen Use Efficiency (NUE)

- Nitrogen use efficiency is defined as the ratio of the crop nitrogen uptake, to the total input of nitrogen fertilizer.
- A good NUE score varies when it comes to a country's location and the overall size of the land.
- A low NUE score indicates a nitrogen surplus.
- A nitrogen surplus is the potential surplus of nitrogen levels on agricultural land and this can have negative effects on both economic and environmental costs.

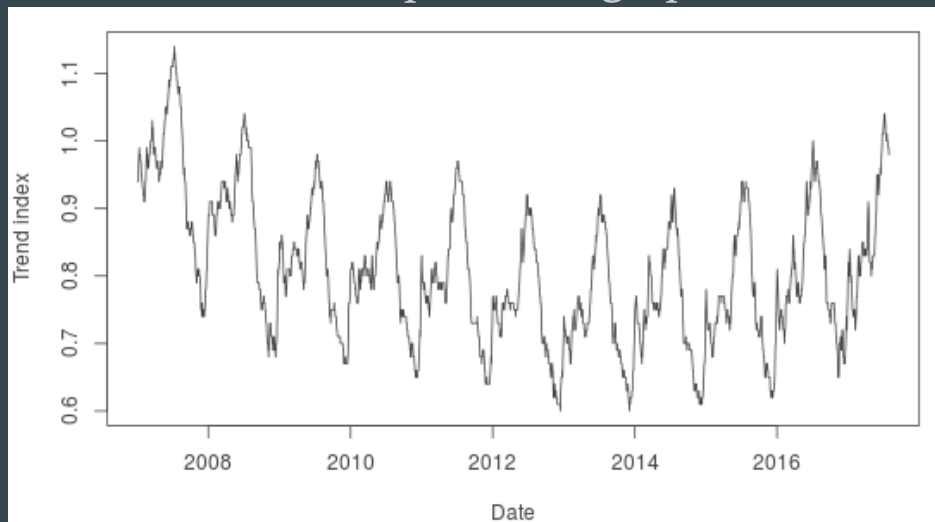
Looking at the data

- CSV files which include the Country name, year, and NUE value.
- File years ranged from 1961-2015.
- About 50,000 rows of data.

	A	B	C	D	E	F	G
827	826	Mexico	MEX	NUE	1961	0.702748	
828	827	Mongolia	MNG	NUE	1961	0.040111	
829	828	Morocco	MAR	NUE	1961	0.960537	
830	829	Mozambique	MOZ	NUE	1961	1.368332	
831	830	Namibia	NAM	NUE	1961	0.218383	
832	831	Nepal	NPL	NUE	1961	0.610024	
833	832	Netherlands	NLD	NUE	1961	0.17043	
834	833	New Zealand	NZL	NUE	1961	0.239353	
835	834	Nicaragua	NIC	NUE	1961	0.469343	
836	835	Niger	NER	NUE	1961	0.781139	
837	836	Nigeria	NGA	NUE	1961	0.98778	
838	837	Norway	NOR	NUE	1961	0.175202	
839	838	Pakistan	PAK	NUE	1961	0.517244	
840	839	Panama	PAN	NUE	1961	0.276646	
841	840	Papua New Guinea	PNG	NUE	1961	0.931439	
842	841	Paraguay	PRY	NUE	1961	0.631205	
843	842	Peru	PER	NUE	1961	0.474091	
844	843	Philippines	PHL	NUE	1961	0.452304	
845	844	Poland	POL	NUE	1961	0.540479	
846	845	Portugal	PRT	NUE	1961	0.322755	
847	846	Republic of Korea	KOR	NUE	1961	0.43959	
848	847	Romania	ROU	NUE	1961	0.408945	
849	848	Rwanda	RWA	NUE	1961	0.949523	
850	849	Saudi Arabia	SAU	NUE	1961	1.852997	
851	850	Senegal	SEN	NUE	1961	0.59224	

R Shiny

- R is a programming language that is mainly used for statistical computing and graphics.
- Shiny is an open source R package that amplifies the uses of R and helps build web applications as well as various plots and graphs.



Goals

- Use R Shiny and the given data to create an informative web application that uses an interactable map in which users can select various countries and display graphs that shows that country's NUE & NUE surplus from the range of years within the data.

Tasks

- implement a tab format for the application
- Homepage
 - Information describing what NUE is, what the data is showing, why it's important, and also how to read & interact with the graphs.
 - Clickable download buttons that will instantly download the CSV files.
 - Links
 - Our Github
 - UMCES homepage
 - Source page
- NUE Tab
 - Implemented an interactive world map and display NUE graphs and surplus graphs when a country is clicked.
 - Implemented a button that would allow users to take screenshots of the graphs.
 - When clicking a second country display both the most recent graphs and previous graphs so the user can compare.

Challenges & What I learned

- R Shiny
- Zoom & communication
 - Weekly meetings
- Working with others
 - COSC 425 & 426
- Github
- Time management