Plan Overview

A Data Management Plan created using DMPTool-Stage

DMP ID: https://doi.org/10.48321/D11S3B

Title: Balancing crop and ecosystem service production in the U.S. Corn Belt through spatially targeted conservation

Creator: Ellen Audia - **ORCID:** 0000-0003-4168-8705

Affiliation: Iowa State University (iastate.edu)

Principal Investigator: Lisa Schulte Moore, John Tyndall

Data Manager: Ellen Audia

Funder: Iowa State University (iastate.edu)

Funding opportunity number: PG110214

Grant: https://cchange.research.iastate.edu/

Template: G2G Draft Custom DMP Template

Project abstract:

This master's thesis tests and provides data and methodologies for spatially targeting conservation in the Corn Belt region of the U.S.

Start date: 05-05-2019

End date: 05-05-2021

Last modified: 08-07-2023

Copyright information:

language used, but using any of the plan's text does not imply that the creator(s) endorse, or have any relationship to, your project or proposal

Balancing crop and ecosystem service production in the U.S. Corn Belt through spatially targeted conservation

All databases associated with each chapter will have metadata, all codes associated with each chapter will be thoroughly commented and have README files. These will all be housed in ISU's DataShare library. Open-source data associated with each chapter will not be housed in ISU's data repository.

Chapter 2 Data: Valuing multiple ecosystem services under varying land-use scenarios in the Grand River Basin in Iowa and Missouri

Name	Format	Resolution	Size	Source	Open Source?	File Name
National Land Cover Dataset (2001 and 2016)	.tif	30m		Multi-Resolution Land Characteristics Consortium (2001;2016)	Yes	na
Digital Elevation Model	.tif	10m	601MB	National Hydrography Dataset Plus High Resolution, USGS 2018	Yes	na
Average Annual Precipitation	.tif	800m	117KB	PRISM (1981-2010)	Yes	na
Rainfall Erosivity Raster (R-Factor)	.tif	800m	141KB	NOAA OpenNSPECT 2013	Yes	na
Soil Erodibility (k-factor)	.tif	10m	2.14GB	NRCS gSSURGO 2017	Yes	na
National Commodity Crop Productivity Index (NCCPI)	.tif	30m	16.4MB	NRCS gSSURGO 2017	Yes	na
Nutrient export coefficients and retention lengths for NDR model	.csv	na	2KB	Redhead et al. (2018), Reckhow et al. (1980), Jeje (2006), Endreny and Wood (2003)	No	NDRBioPhys
Sediment export coefficients (calibrated) for SDR model	.csv	na	1KB	Hamel et al. (2015), Hamel et al. (2017), Leh et al. (2013)	No	SDRBioPhys
Carbon sequestration pool values for carbon model	.csv	na	1KB	IPCC (2006), Ruesch and Gibbs (2008), Garrastazu et al. (2015), Pouyat et al. (2002), Liebman et al. (2013), Tuuls (2011), Rigel et al. (2013), Pratt et al. (1984), Polasky et al. (2011)	No	CarbonPools

Pollinator nesting preferences, foraging activity, ranges, and relative abundance for pollinator model	.csv	na	1KB	Greenleaf et al. (2007), Cameron et al. (1996), Eickwort and Ginsberg (1980), Grant et al. (2018)	No	PollinatorBioPhys
Pollinator land cover nesting suitability and resource ratings	.csv	na	1KB	na	No	GuildTable
Perennial cover enterprise budgets	.csv	na	2KB	Plastina, Johanns, and Wynne (2019), University of Nebraska-Lincoln Crop Watch (2017), University of Northern Iowa Prairie Seed Calculator, Massey and White (2016), Massey and McClure (2018)	No	EnterpriseBudget
Land cover change python code	.txt	na	1KB	na	No	LCChangeCode

Chapter 3 Data: Mapping the Soil Vulnerability Index across broad spatial extents to guide conservation efforts

Name	Format	Resolution	Size	Source	Open Source?
Digital Elevation Models	.tif	2m	119 GB	ISU GIS (2016)	Yes
ACPF Database: field boundaries, land use information, NRCS soils data rasters	.shp, .dbf, .tif	2-10m	6.23 GB	Tomer et al. (2013, 2015), ISU GIS (2019), NRCS gSSURGO	Yes
ArcGIS SVI processing tool python code	.txt	na	23KB	na	No
Output SVI results: field boundaries, SVI by field, land-use/crop history information, gSSURGO soil raster, SVI soil unit map	.fgd	na	129 GB	na	Yes - available for download at https://www.gis.iastate.edu/gisf/projects/acpf

Chapter 4 Data: Jointly promoting environmental and economic benefits in Corn Belt Agriculture through spatial optimization

Name	Format	Resolution	Size	Source	Open Source?	File Name
ACPF Output Data for East Big Creek; hydro-conditioned DEM, Financials Tool	.gdb	varies	31.2 MB	na	Yes - must hydro-condition and utilize ACPF toolboxes to generate full output	na
Field-BMP combinations	.csv	na	27.7 KB	na	No	FieldBMPCombinations
BMP Enterprise budgets	.csv	na	18KB	Bravard et al. (2020)	Yes	BMP_EnterpriseBudgets
BMP IMPLAN budgets	.csv	na	21KB	Modified from Bravard et al. (2020)	No	BMP_IMPLANBudgets
BMP impact summaries	.csv	na	97KB	na	No	CBSImpactSummary, RIBImpactSummary, NRWImpactSummary
Optimization model python code	.txt	na	16 KB	original code	No	OptimizationCode

Chapter 2: All open-source data was collected from associated repositories. All .csv files and associated data were created in Excel using extensive literature searches. Data outputs were generated using the InVEST model and ArcGIS v 10.8.1.

Chapter 3: All open-source data was collected and saved by David E. James from data repositories. Python codes were original work. Output data was generated using ArcGIS v 10.8.1.

Chapter 4: All input data was generated using the ACPF toolbox in ArcGIS v 10.8.1 and gathered by Adriana Valcu-Lisman. All .csv files were generated using Excel.

There are no ethical or legal issues.

E. Audia, L. Schulte, and J. Tyndall will own the copyright and IPR of all data.

All research outputs will be licensed under CC BY-NC

All open-source data will not be stored/backed up.

Chapter 2: The .csv files, .txt files, and associated metadata and README files will be stored on ISU's DataShare library and backed up on CyBox and E. Audia's local hard drive. Any associated spatial files (i.e. .tif, .shp, .dbf) will be stored on CyBox and E. Audia's local hard drive.

Chapter 3: The .txt file and associated README file will be stored on ISU's DataShare library. The output

database will be stored on ISU's GIS ACPF page and backed up on CyBox and E. Audia's local hard drive.

Chapter 4: The .csv files, .txt files and associated metadata and README files will be stored on ISU's DataShare library and backed up on CyBox and E. Audia's local hard drive. All spatial data files will be stored and backed up on CyBox and E. Audia's local hard drive.

All open-source data is accessible, and its security is not under our authority.

Chapter 2: Data associated with chapter 2 will be accessible on ISU's DataShare library, secured there, but not released until publication.

Chapter 3: Data associated with chapter 3 is accessible and secured on ISU's GIS ACPF webpage.

Chapter 4: Data associated with chapter 4 will be accessible and secured on ISU's DataShare library, but not released until publication.

Chapter 3's output data (field-level SVI results) will have long-term value and should be preserved.

Chapter 2's input data (InVEST input tables) can be re-created and updated throughout time, which will influence output data. These need not be preserved long-term.

Chapter 4's input data can be re-created and updated throughout time, which will influence output data. These need not be preserved long-term.

Chapter 3's data will be made accessible and reusable on ISU's GIS ACPF webpage.

Data will be directly shared if asked until publicly available through ISU DataShare.

ISU DataShare will host the data and metadata.

E. Audia is responsible for the data collection, validation, analysis, and publication.

L. Schulte Moore and J. Tyndall will oversee and advise the above data management.

Planned Research Outputs

Dataset - "Iowa ACPF Soil Vulnerability Index"

Soil Vulnerability Index classifications (runoff potential and leaching potential) of all farm fields across Iowa, USA. This dataset can be found at https://www.gis.iastate.edu/gisf/projects/acpf

Dataset - "InVEST Input Data "

All the input data tables and metadata needed to run the NDR, SDR, Carbon, and Pollinator InVEST modules for the Grand River Basin in Iowa and Missouri, USA and the enterprise budget used to investigate private economic outcomes.

Text - "Soil Vulnerability Index python code"

The python code used to generate SVI results for all farm fields in Iowa, USA.

Dataset - "East Big Creek Optimization Data"

All best management practice-field combination data, IMPLAN budgets and impact summaries, and metadata for East Big Creek in Polk and Boone counties of Iowa, USA.

Text - "East Big Creek Optimization Code"

Python code used to run the optimization model to maximize water quality and biodiversity under cost constraints in East Big Creek watershed of Iowa, USA.

Text - "Land Cover Change Code for InVEST"

The python code used to generate alternate land cover scenarios in the Grand River Basin of Iowa and Missouri, USA for use in the InVEST modules.

Planned research output details

Title	Type	Anticipated release date	Initial access level	Intended repository(ies)	Anticipated file size	License	Metadata standard(s)	May contain sensitive data?	May contain PII?
Iowa ACPF Soil Vulnerability Index	Dataset	2020-09-30	Open	None specified	125 GB	None specified	None specified	No	No
InVEST Input Data	Dataset	2021-04-21	Open	DataShare: the Open Data Repository of Iowa State University	1 MB	Creative Commons Attribution Share Alike 4.0 International	None specified	No	No
Soil Vulnerability Index python code	Text	2021-04-21	Open	DataShare: the Open Data Repository of Iowa State University	1 MB	Creative Commons Attribution Share Alike 4.0 International	None specified	No	No
East Big Creek Optimization Data	Dataset	2021-04-21	Open	DataShare: the Open Data Repository of Iowa State University	1 MB	Creative Commons Attribution Share Alike 4.0 International	None specified	No	No
East Big Creek Optimization Code	Text	2021-04-21	Open	DataShare: the Open Data Repository of Iowa State University	6,000	Creative Commons Attribution Share Alike 4.0 International	None specified	No	No
Land Cover Change Code for InVEST	Text	2021-04-21	Open	DataShare: the Open Data Repository of Iowa State University	1,000	Creative Commons Attribution Share Alike 4.0 International	None specified	No	No