IOWA WATER QUALITY INITIATIVE

from strategy to implementation

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IOWA DEPARTMENT OF AGRICULTURE AND LAND STEWARDSHIP

Nutrient Reduction Strategy

Reduce nitrogen (N) and phosphorus (P) loads to Iowa waters and the Gulf of Mexico by at least 45% (*Gulf Hypoxia Task Force*). Based on evidence to prevent or remove significant levels of nutrients from Iowa waters

- Historically, these efforts have centered on soil conservation
- Led by Iowa Department of Agriculture and Land Stewardship, Iowa Department of Natural Resources, and Iowa State University
- Integration of non-point (*agriculture*) and point (*industrial and municipal wastewater treatment plants*) sources working together for common goal
    - Of 36M acres in Iowa, 90% in agricultural use and 24M acres in row crops

***The strategy is a dynamic document that will change over time as new information, data, and science is discovered and adopted**

Water Quality Initiative

The **Iowa Water Quality Initiative** (WQI) is the action plan for the **Iowa Nutrient Reduction Strategy** (NRS) established in 2013. The WQI improves water quality through a collaborative, science- and research-based approach that is evaluated and reported by a team of independent researchers from multiple institutions, led by Iowa State University. This comprehensive approach allows farmers and cities alike to adopt conservation practices that fit their unique needs, lands, and budgets.

Strategy Practices

Iowa Water Quality Initiative

Nitrogen moves primarily as nitrate-N with water

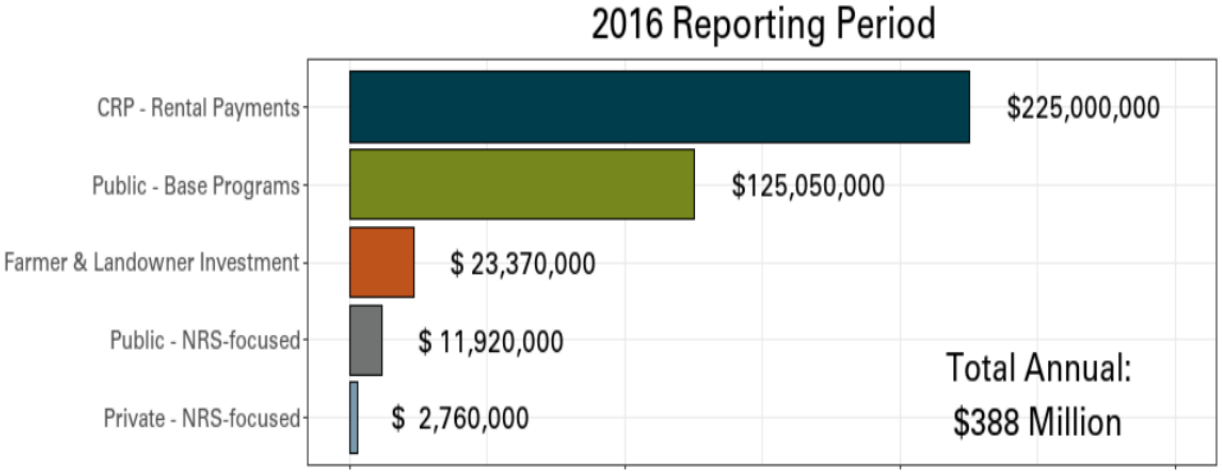
	Practice	Comments	% Nitrate-N Reduction*	% Corn Yield Change**
			Average (SD*)	Average (SD*)
Nitrogen Management	Timing	Moving from fall to spring pre-plant application	6 (25)	4 (16)
		Spring pre-plant/sidedress 40-60 split Compared to fall-applied	5 (28)	10 (7)
		Sidedress – Compared to pre-plant application	7 (37)	0 (3)
		Sidedress – Soil test based compared to pre-plant	4 (20)	13 (22)**
	Source	Liquid swine manure compared to spring-applied fertilizer	4 (11)	0 (13)
		Poultry manure compared to spring-applied fertilizer	-3 (20)	-2 (14)
	Nitrogen Application Rate	Nitrogen rate at the MRTN (0.10 N:corn price ratio) compared to current estimated application rate. (ISU Corn Nitrogen Rate Calculator – http://extension.agron.iastate.edu/soilfertility/nrate.aspx can be used to estimate MRTN but this would change Nitrate-N concentration reduction)	10	-1
	Nitrification Inhibitor	Nitrapyrin in fall – Compared to fall-applied without Nitrapyrin	9 (19)	6 (22)
	Cover Crops	Rye	31 (29)	-6 (7)
		Oat	28 (2)	-5 (1)
	Living Mulches	e.g. Kura clover – Nitrate-N reduction from one site	41 (16)	-9 (32)
Land Use	Perennial	Energy Crops – Compared to spring-applied fertilizer	72 (23)	
		Land Retirement (CRP) – Compared to spring-applied fertilizer	85 (9)	
	Extended Rotations	At least 2 years of alfalfa in a 4 or 5 year rotation	42 (12)	7 (7)
	Grazed Pastures	No pertinent information from Iowa – assume similar to CRP	85	
Edge-of-Field	Drainage Water Mgmt.	No impact on concentration	33 (32)	
	Shallow Drainage	No impact on concentration	32 (15)	
	Wetlands	Targeted water quality	52	
	Bioreactors		43 (21)	
	Buffers	Only for water that interacts with the active zone below the buffer. This would only be a fraction of all water that makes it to a stream.	91 (20)	
	Saturated Buffers	Divert fraction of tile drainage into riparian buffer to remove Nitrate-N by denitrification.	50 (13)	

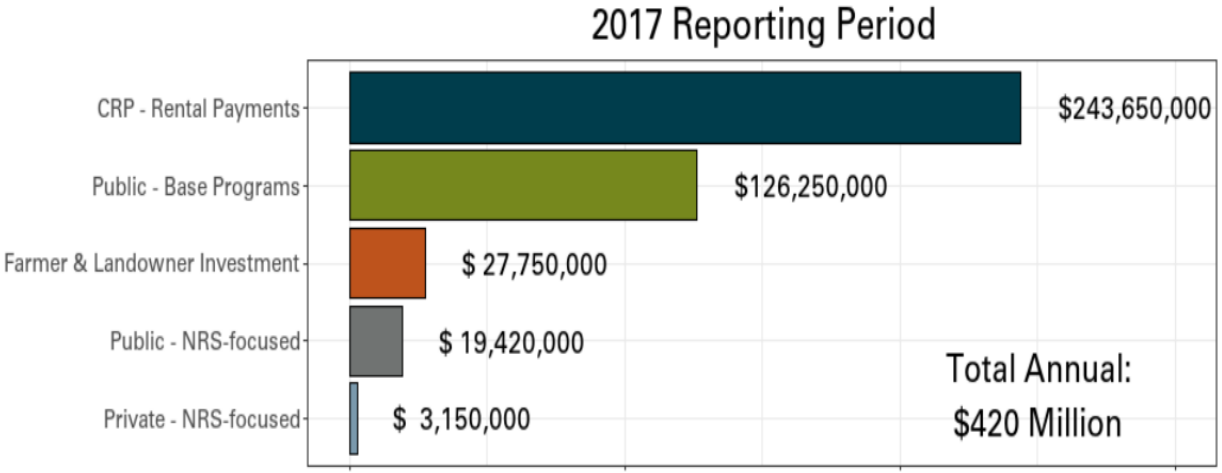
Phosphorus moves primarily with eroded soil

	Practice	Comments	% P Load Reduction[a]	% Corn Yield Change[b]
			Average (SD[c])	Average (SD[c])
Phosphorus Management Practices	Phosphorus Application	Applying P based on crop removal – Assuming optimal STP level and P incorporation	0.6[d]	0
		Soil-Test P – No P applied until STP drops to optimum	17[e]	0
	Source of Phosphorus	Liquid swine, dairy, and poultry manure compared to commercial fertilizer – Runoff shortly after application	46 (45)	-1 (13)
		Beef manure compared to commercial fertilizer – Runoff shortly after application	46 (96)	
	Placement of Phosphorus	Broadcast incorporated within 1 week compared to no incorporation, same tillage	36 (27)	0
		With seed or knifed bands compared to surface application, no incorporation	24 (46)	0
	Cover Crops	Winter rye	29 (37	-6 (7)
	Tillage	Conservation till – chisel plowing compared to moldboard plowing	33 (49)	0 (6)
		No till compared to chisel plowing	90 (17)	-6 (8)
Land Use Change	Perennial Vegetation	Energy Crops	34 (34)	
		Land Retirement (CRP)	75	
		Grazed pastures	59 (42)	
Erosion Control and Edge-of-Field Practices	Terraces		77 (19)	
	Buffers		58 (32)	
	Control	Sedimentation basins or ponds	85	

Conservation Investment
the numbers

Funding obligated for Nutrient Reduction Strategy efforts by partner organizations





*Farmer & Landowner Investment accounts only for select practices that received cost-share funding.

Nutrient Management

Meet the nutrient needs of the crop to be grown, while minimizing the loss of nutrients to surface and groundwater

4Rs
Right source
Right rate
Right time
Right place

Sidedressing, Tillage, Spring-Applied Nitrogen, Nutrient Source, Soil-Test P, P Placement, Site-specific P Management, Nitrification Inhibitor, and Nitrogen Application Rate

Source: Iowa State University Extension and Outreach

nutrient stewardship

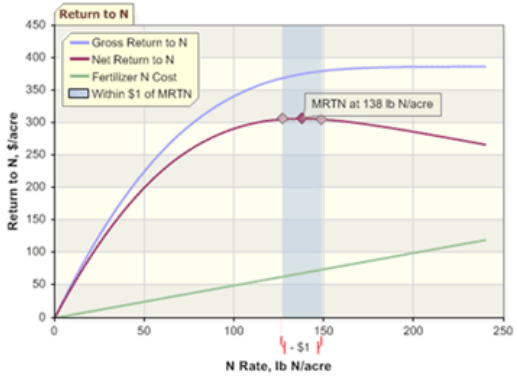
N WATCH By: FS GROWMARK

Iowa Certified Crop Advisers
Trusted Advice to Help You Grow

THE CLIMATE CORPORATION

AGSOLVER

encirca



Cover Crops

Reduce soil erosion

Improve soil structure & permeability

Provide ground cover

Scavenge residual nitrogen

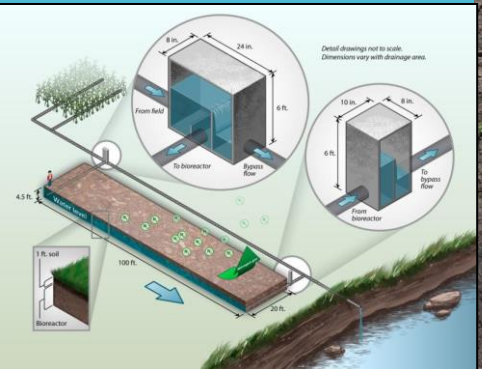
Average of 28-31% reduction in N concentration and 29% reduction in P loss

Source: CleanWaterIowa.org

Edge-of-Field (EOF)

Bioreactors are lined pits filled with woodchips; tile drainage water flows through and denitrifying bacteria converts nitrate into di-nitrogen gas.

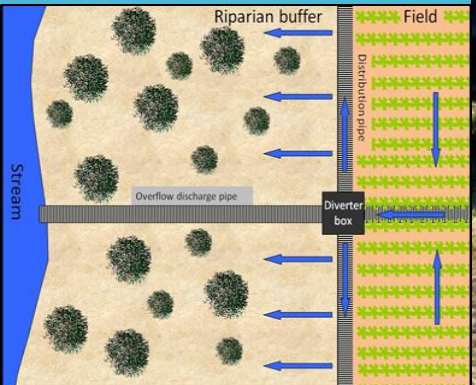
One bioreactor can treat up to 100 acres of tile-drained land.



Edge-of-Field (EOF)

Saturated Buffers are lateral tile systems that re-distribute tile drainage water through the streamside buffer to denitrify before reaching the stream

One saturated buffer can treat up to 100 acres land.



Edge-of-Field (EOF)

Wetlands are strategically located and designed to remove nitrate from tile-drainage water from cropland areas.

The larger the wetland, the greater the percentage of N removal; nitrate concentration reduction averages 52%. Wetlands also provide improved aesthetics and Iowa game and waterfowl habitat.

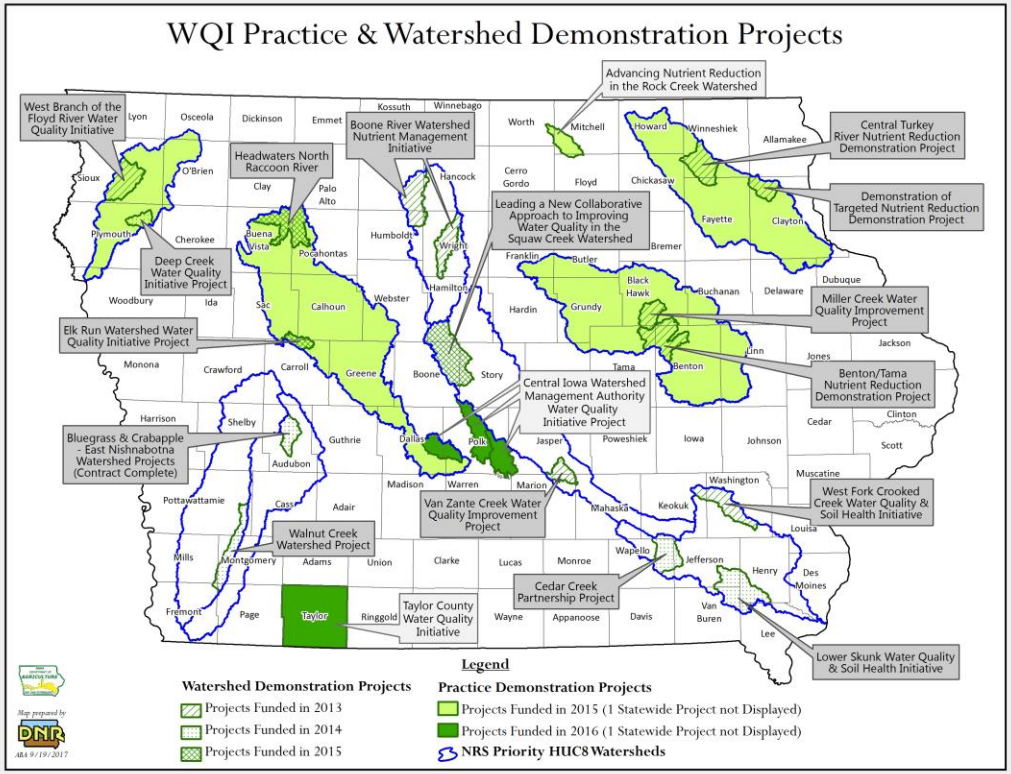
Source: CleanWaterIowa.org

Active Demonstration Projects Through 2017

56 Current Demonstration Projects

- 15 Watershed Demonstration Projects
- 7 Practice Demonstration Projects
- 34 Urban Demonstration Projects
- Over 200 partners Engaged

Learn more at *cleanwateriowa.org*



Targeted *priority watersheds* in order to:

- Demonstrate practices and technologies outlined in Nutrient Reduction Strategy
- Foster partnerships with wide range of project stakeholders within the community
- Educate and inform community members about adoption and adaption of practices
- Create local/regional hubs to share learnings with farmers, landowners, farm managers, peer networks, etc

Regional Conservation Partnership Program
RCPP

2015 Summary
Iowa Targeted Demonstration Watershed Partnership Project
Awarded $3.5M with almost $4.5M in partner contributions

Middle Cedar Partnership Project, City of Cedar Rapids – partner
Awarded $2M with almost $2.3M in partner contributions

2016 Summary
Midwest Agriculture Water Quality Partnership Project – co-led with Iowa Agricultural Water Alliance (IAWA) and 45 other partners
Awarded $9.5M with $37M in partner contributions

Upper Cedar Urban-Rural Partnership Project, City of Charles City – partner
Awarded $1.6M with almost $1.6M in partner contributions

NRCS

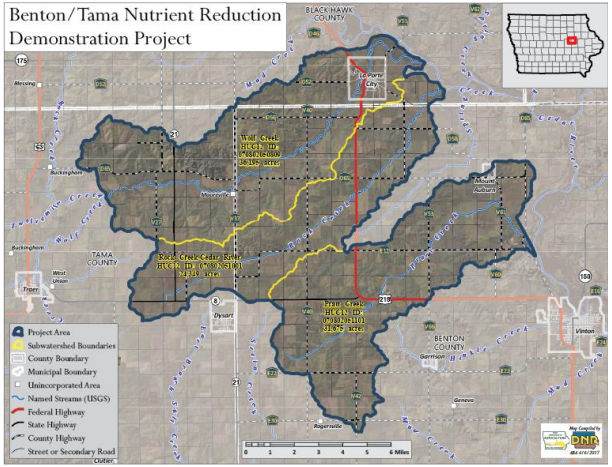
Demo Example: Benton Tama Nutrient Reduction Demonstration Project

- Project takes an innovative approach to water quality by partnering with local seed corn dealers and growers to implement cover crops and other priority conservation practices

- Key partners working with the Benton and Tama SWCD Include: NRCS, DuPont Pioneer, Iowa Soybean Association, Iowa Pork Producers, Iowa Learning Farms, Iowa Farm Bureau, ISU Extension, The Nature Conservancy and more…

Select Accomplishments 2013-Present

- Part of the Middle Cedar RCPP with Cedar Rapids
- Developed Nutrient Reduction WS Management Plan
- Nearly 8,000 acres of cover crops implemented
- 2 saturated buffers recently installed
- Many more acres in conservation tillage, N management, etc.
- Entered year 4 of WQI funding in January 2017



Demo Example: Taylor County Practice Demonstration Project

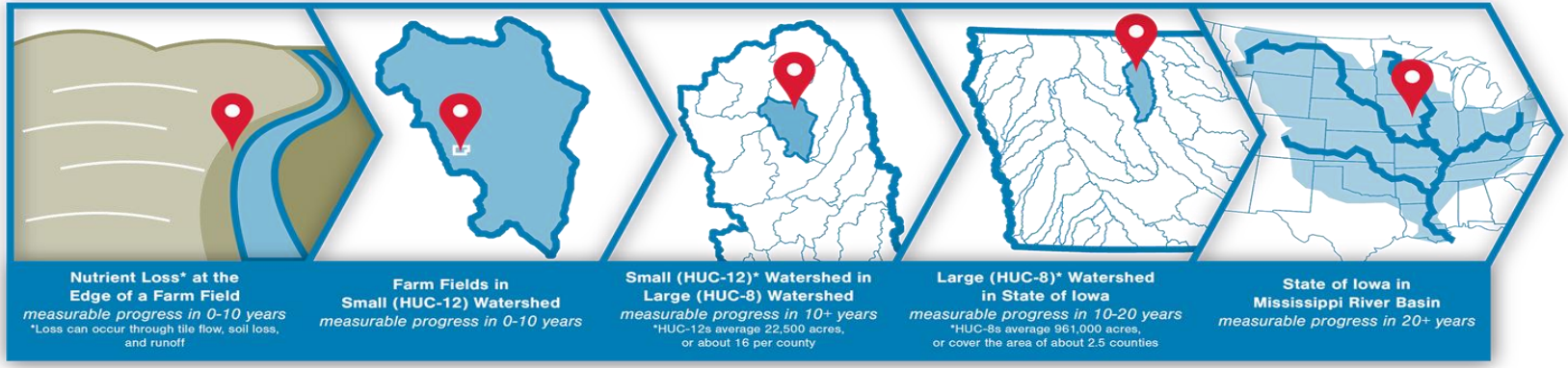
- This project will work with farmers in Taylor County by promoting alternative land management practices on farmed areas identified to be marginal or unprofitable. The project will evaluate the specific production levels and goals within their farming operation and evaluate current farm scale profitability combined with conservation practice and land use alternatives.
- Key partners working with the Taylor SWCD Include: NRCS, AgSolver, ISU Extension, Iowa Cattleman's, Southern Iowa Forage and Livestock and more…

Select Accomplishments 2016-Present

- Over 575 acres enrolled with project conservation practices
- Nearly 300 marginal acres seeded down in 2017
- Nearly 15,000 acres enrolled in AgSolver, Inc.'s Profit Zone Manager tool
- Over 30 producers participating
- Alternative land uses implemented on marginal acres

Making an Impact on Iowa Water
the scale

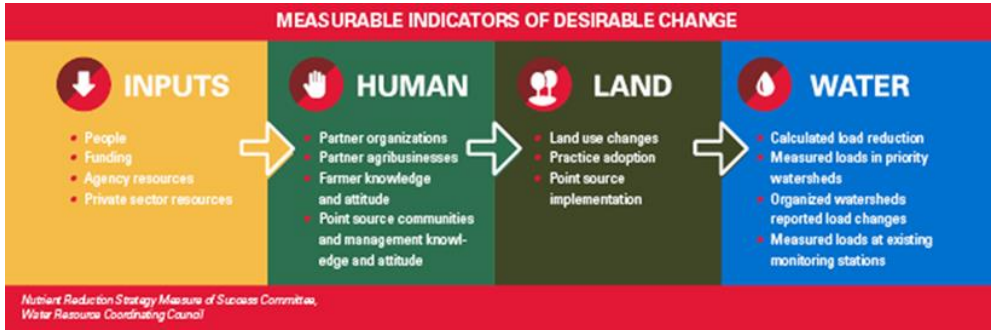
- Iowa Nutrient Reduction Strategy Stream Water Quality Monitoring in Iowa
  - http://www.nutrientstrategy.iastate.edu/documents
- WQI focused on implementation of proven technologies and documenting progress
- WQI supporting monitoring at appropriate scale within project areas to inform and prioritize implementation.



Source: ISU/NRS Stream Water Quality Monitoring in Iowa

Measuring Progress
Logic Model

- Just completed third report transitioned to logic model
  - nutrientstrategy.iastate.edu/documents (2017 final report pending)
- Continue to advance data collection and reporting
  - Establishment of the Iowa Nutrient Research Center (INRC)
- Existing sources for data collection, potential for improvement, start from scratch



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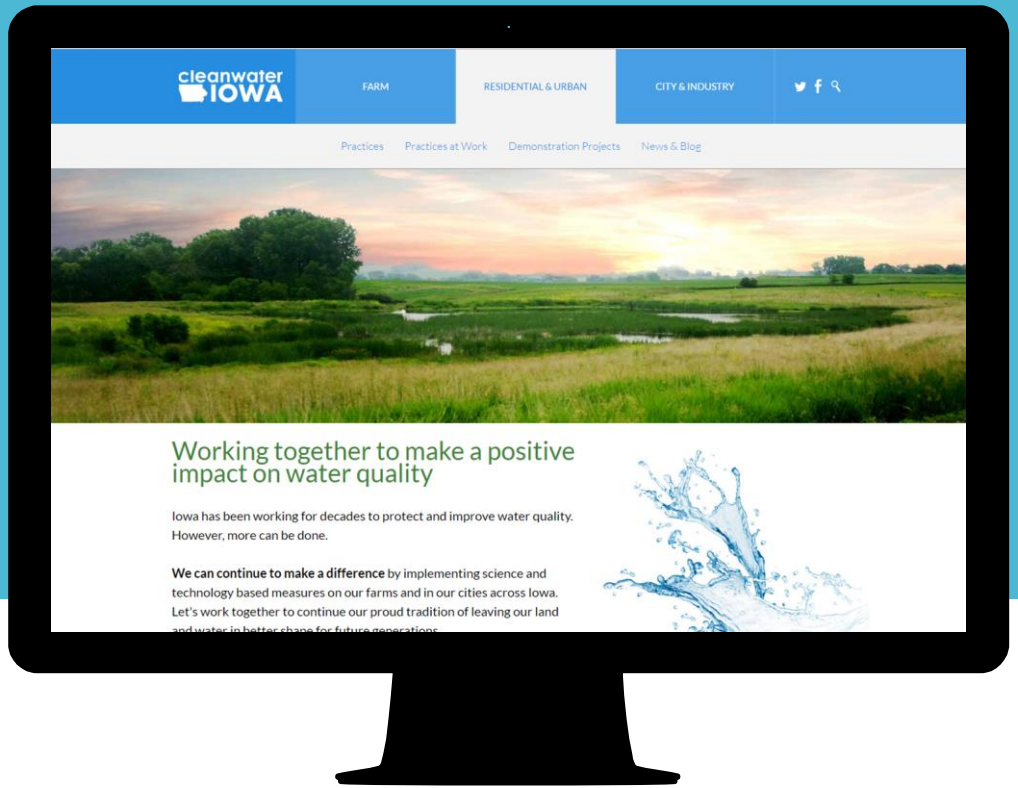
Learn more about WQI projects, discover helpful tools, and dive deeper into conservation practices