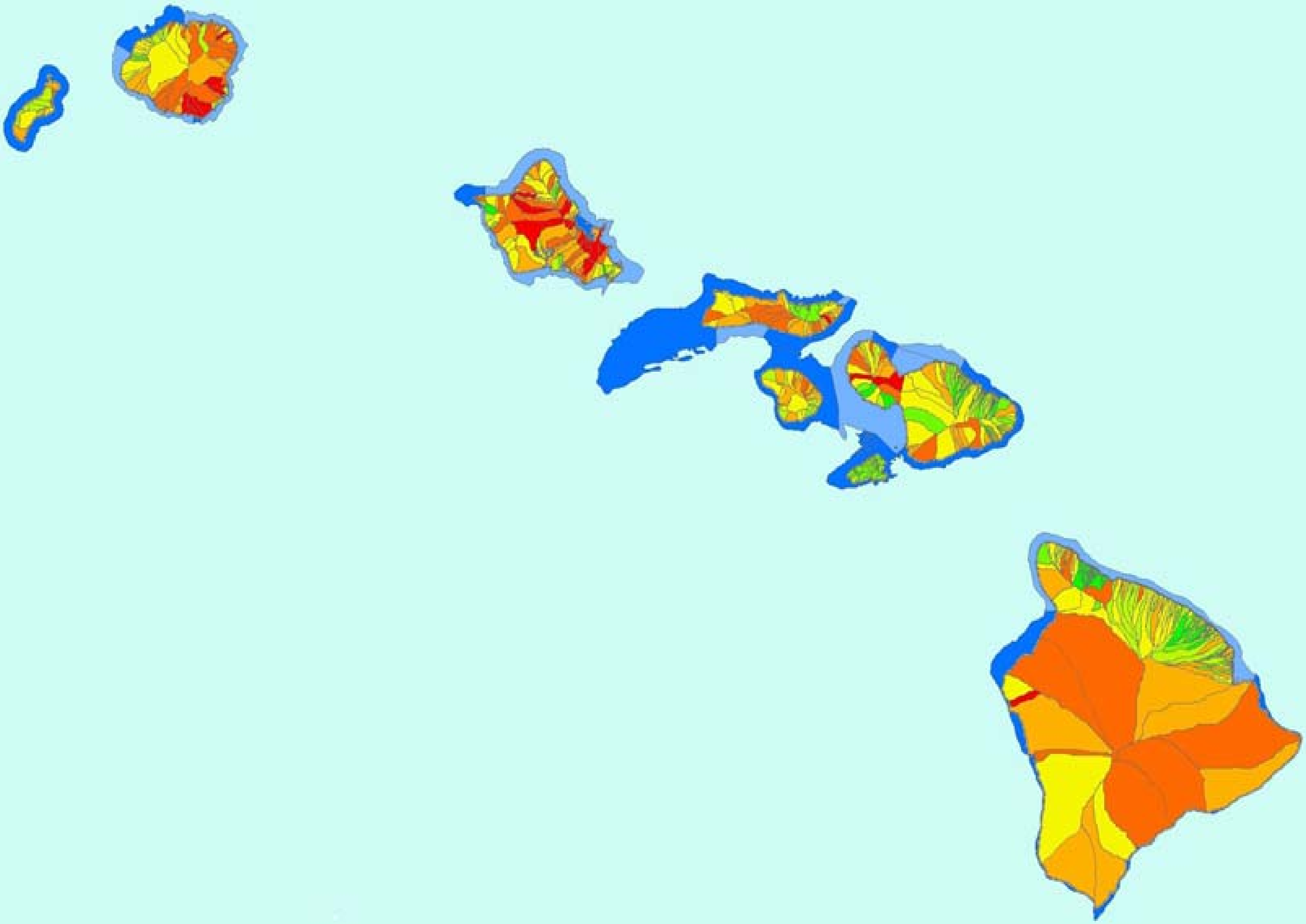
Hawai`i Watershed Prioritization Process



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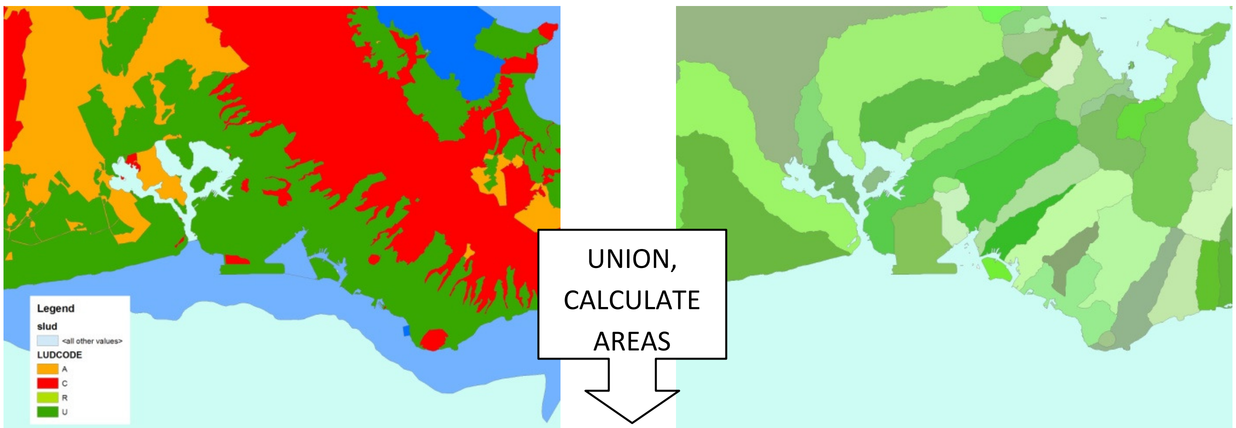
Hawaii CZM Program
Coastal Zone Management

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

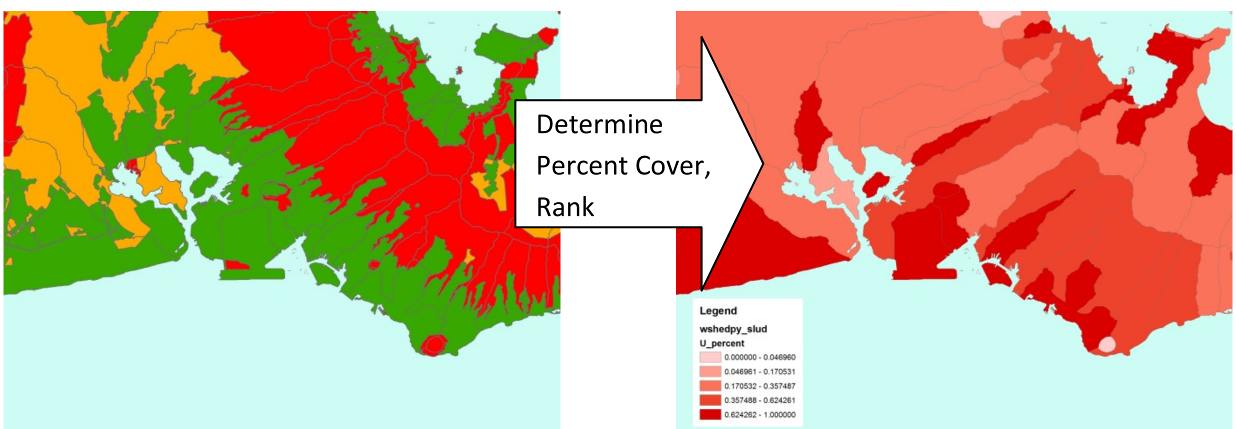
Introduction

In order to prioritize watershed planning efforts statewide a GIS was compiled. GIS systems are instrumental in facilitating the quantitative assessment of landscape influences on aquatic ecosystems and watershed scale studies of water quality. GIS tools allow comparison and processing of many different spatial information layers. Watershed land cover has been shown to be strongly correlated to water quality, especially nutrients (ref). Non-parametric statistical methods were employed to allow direct comparison of different layers with different units and distributions. Similar normalized rank approaches have been used to set restoration priorities in a TMDL context (Stringfellow, 2008).

Schematic illustration of processing steps



Above are representations of source layers for State Land Use District and Watershed areas. In ArcGIS the layers are joined with the command UNION and resulting areas determined with command CALCULATE AREAS.



With State Land Use Districts divided into Watershed Units (left), percent cover and rank of any SLUD classification can be computed.

Criteria development

Since the source data layers representing the different criteria were of several different forms, the criteria had to be developed individually. Using the ArcGIS Spatial Analysis toolbox function 'Union', layers of one type (LUPAG, CCAP, etc.) were divided along watershed boundaries. The Calculate Areas function was then used to determine the area of each new polygon. The resulting attributes associated with each polygon (including data from both Union-ed files) were read into Excel for further processing. Pivot tables were used to summarize polygon areas with different attributes (eg. land covers) for each watershed in the state. The percent cover (area x / total wshed area) of areas in any given class could then be easily calculated.

Since each criterion has different units and different distributions a statistical technique known as rank normalization was used to compare criteria equally. Watersheds were compared to all others for the property of interest and ranked from 1 to 580 essentially ordering watersheds from worst (1) to best (580). All watersheds with 0 or N/A values were assigned the maximum 580 ranking to eliminate bias among minimum values. All ranks were divided by the maximum rank of 580 to generate a score from 0 to 1 (0 to 100%). Similar to a score on an exam, watersheds with lower score are considered more threatened or susceptible and higher priority.

There are currently four broad classes of criteria; stressors, sensitive areas, assets, and indicators. Within each class of criteria more and better source data will serve to improve the utility of the watershed prioritization model. These data, once available, can be easily incorporated into the model.

Stressors are properties of a watershed that could potentially lead to impairment. Watershed geology, hydrology, land cover and human land use are some factors that contribute to a watershed's susceptibility to disturbance. Stressors fell into three main categories: urban, agriculture, and soil. Layers were averaged within the three categories of stressors, then the three categories were averaged to produce the stressor score.

- Urban areas may negatively impact watershed health by altering hydrology, disturbing soil and introducing pollutants
  - The State Land Use District (SLUD) criterion was derived from 2006 State Land Use Commission maps. Watersheds were ranked by percent Urban classified land cover. Watersheds with greater urban percent cover were ranked higher (scored lower).
  - Watersheds were ranked by change in percent cover of Urban classified land. Watersheds with greater increase in urban classified land were ranked higher (scored lower).
  - Coastal Change Analysis Program land cover data (NOAA 2001). Watersheds with greater High Intensity Developed percent cover were ranked higher (scored lower).
  - Coastal Change Analysis Program land cover data (NOAA 2001). Watersheds with greater Low Intensity Developed percent cover were ranked higher (scored lower).
- Soils – Land lacking vegetative cover or having soils particularly sensitive to disturbance may negatively impact watershed health.

  - The HEL (Highly Erodible Land) criterion was derived from NRCS soil survey data SSURGO database. Watersheds were ranked by their percent land area covered by HEL classified soils.
  - Coastal Change Analysis Program land cover data (NOAA 2001). Watersheds with greater Bare Ground percent cover were ranked higher (scored lower).
- Agriculture – Land in agricultural production may negatively impact watershed health by disturbing soil and introducing excess nutrients from fertilizer.
  - The State Land Use District (SLUD) criterion was derived from 2006 State Land Use Commission maps. Watersheds were ranked by percent Agricultural classified land cover. Watersheds with greater agricultural percent cover were ranked higher (scored lower).
  - Coastal Change Analysis Program land cover data (NOAA 2001). Watersheds with greater Cultivated percent cover were ranked higher (scored lower).
  - The Agricultural Lands of Importance to the State of Hawaii criterion (ALISH) was compiled from 1977 DOA and SCS maps. Watersheds were ranked by Important Agricultural Land percent cover. Watersheds with greater percent cover of IAL were ranked higher (scored lower).

Sensitive Areas are areas likely to be harmed by impaired watershed discharge. Recreation areas, MLCDs, and coral reef are all susceptible to watershed disturbance.

  - Class AA marine Waters (presence/absence 0/1). Watersheds draining to class AA coastal water were assigned a score of 0.2 while watersheds draining to class A were assigned 0.8 (mean +/- 1 standard deviation).
  - Coastal Reserves (presence/absence 0/1) was derived from various sources depicting areas with various reserves, preserves, parks, etc.. Watersheds with reserve areas within 500 m of the coastline were assigned a score of 0.2 while those without were assigned 0.8 (mean +/- 1 standard deviation).
  - Coral Cover was derived from NOAA benthic habitat maps (2007). Watersheds with areas of coral cover within 500m of the coastline were assigned a score of 0.2 while those without were assigned 0.8 (mean +/- 1 standard deviation).

Watershed Assets are properties which would serve to protect a watershed from disturbance. Conservation areas may promote watershed health by managing land for conservation and restricting development.

  - The State Land Use District (SLUD) criterion was derived from 2006 State Land Use Commission maps. Watersheds were ranked by percent Conservation classified land cover. Watersheds with greater conservation percent cover were ranked lower (scored higher).
  - The State Land Use District change (SLUD) criterion was derived by comparing land use district percent cover between a) 1995 and 2000 data sets, and b) 2000 and 2006 data sets. Watersheds were ranked by change in percent cover of Conservation classified

land. Watersheds with greater decrease in conservation classified land were ranked higher (scored lower).

- Mauka Reserves was derived from various sources depicting areas with various reserves, preserves, parks, etc.. Watersheds with greater percent cover in reserve land scored ranked lower (scored higher)

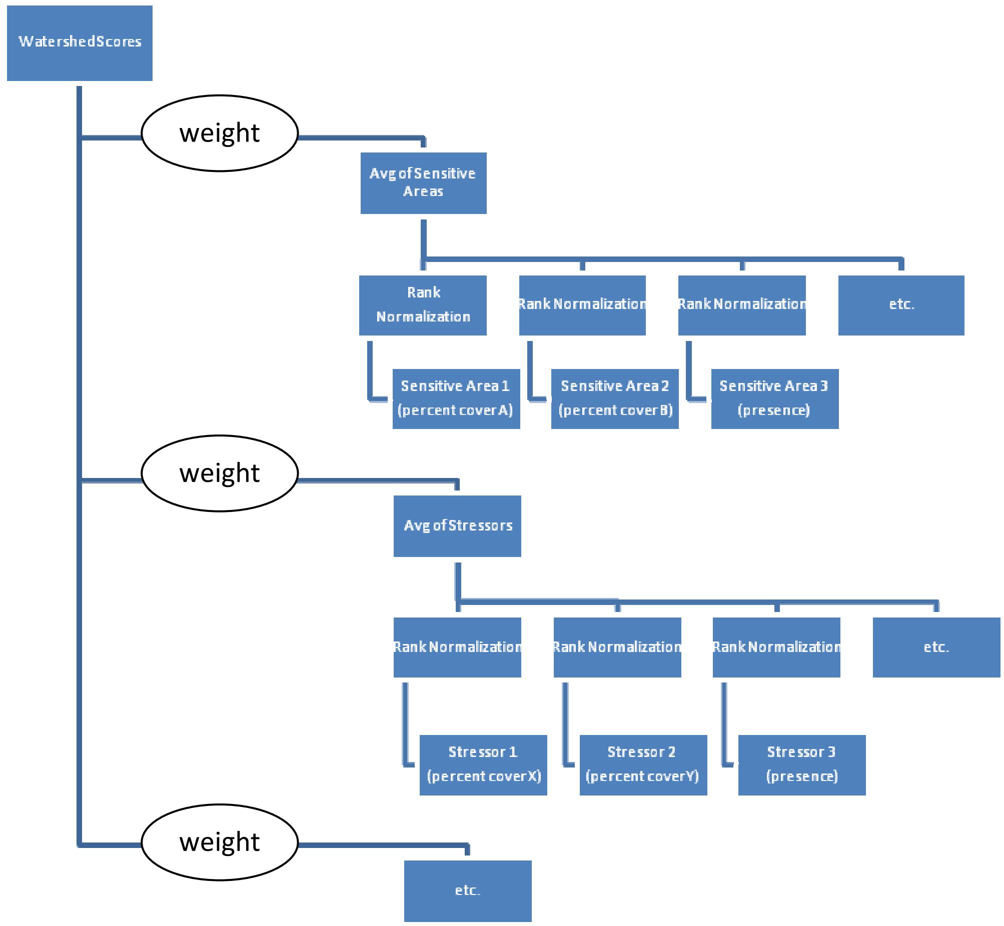
Indicators show those watersheds that are already recognized in need of restoration.

- 303(d) streams 2006 list (presence/absence 0/1). Watersheds containing streams on 303(d) list were assigned 0.2 while watersheds without 303(d) streams were assigned 0.8 (mean +/- 1 standard deviation).
- M. Kido Watershed Health Index (rescaled published index values). Kido's WHI developed a correlation between watershed land cover and the quality of stream habitat for native aquatic species. Higher WHI scores represent watersheds with better aquatic resources.

The DOH list of priority watersheds and Watershed Partnerships was included but not averaged into the total score to compare currently identified areas of priority to the total score prioritization (see following section). Watersheds on the DOH list were assigned 0, while those not on the list were assigned 1.

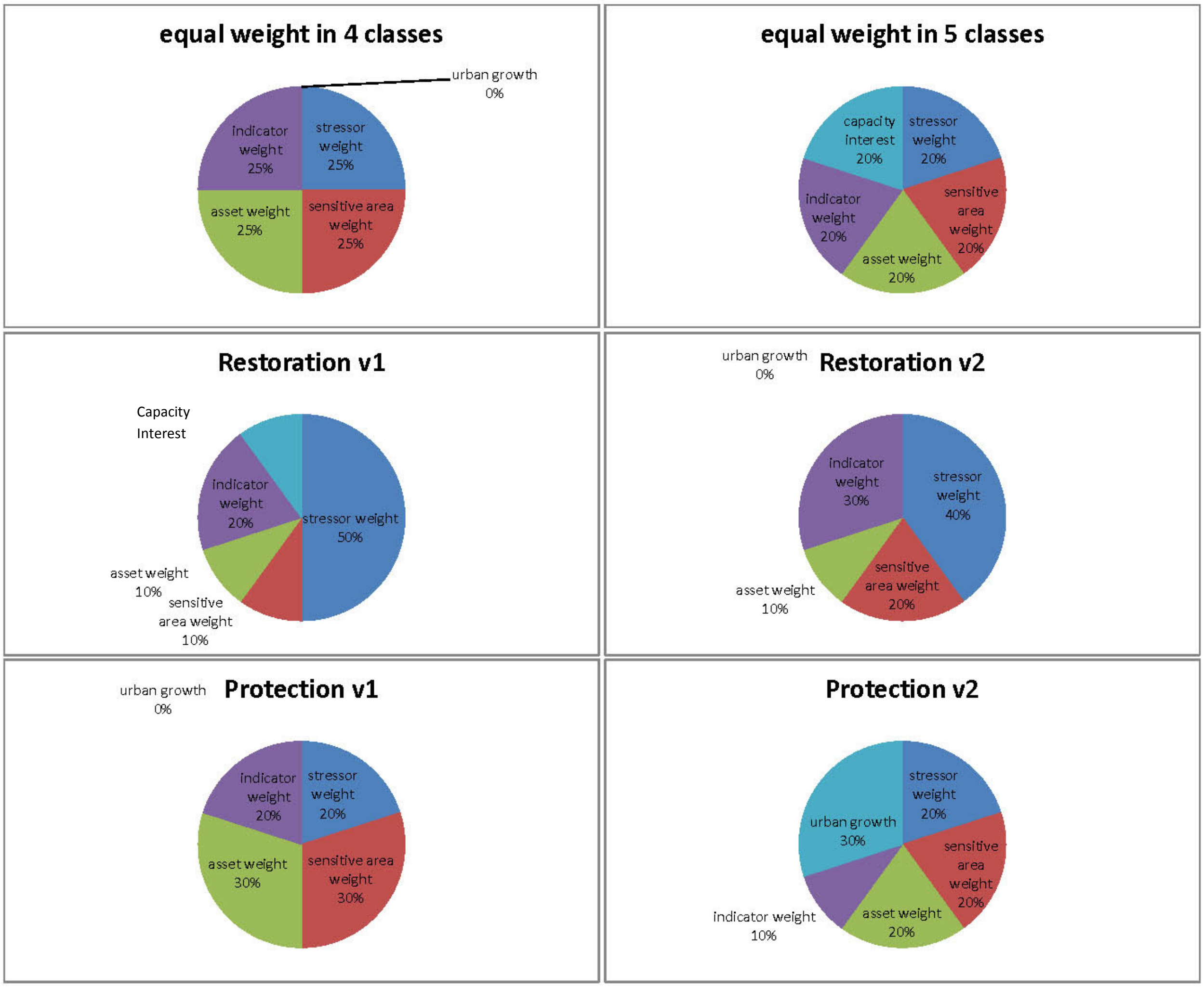
Several more criteria could be useful but due to time constraints were not included in this draft.

- Potential for build out (SLUD – CCAP) urban and cultivated land covers
- Streams with aquatic resources
- Potentially Highly Erodible Land
- 04 and 06 marine 303(d) impaired waters



Results

Several scenarios were evaluated to test the sensitivity of the model to weighting the inputs. The charts shown below depict the different weight scenarios evaluated. There was no effect on the total ranks of incorporating a capacity / interest score derived from the DOH priority watersheds and watersheds belonging to a watershed partnership. Other scenarios weighted stressors or sensitive areas more heavily to develop composite scores reflecting restoration or protection priorities. An urban growth layer was also included in one scenario outside of the other classes. The Urban growth was derived later in the development process from various maps produced by each county depicting areas planned for urban growth. Watersheds with planned urban expansion areas were assigned 0.2 while those not planned for urban expansion were assigned 0.8 (mean +/- 1 standard deviation).



The table below shows watersheds identified in the top 66 (containing the top 50 listed from the restoration 2 scenario) in each weight scenario and in two previous versions of the prioritization process using different layers and grouping methods. On the far right column in the table is the sum of the number of times a watershed appears in the top 50 in the weight scenarios excluding those termed protection. Correlation analyses were performed on the weight scenarios. The Restoration V2 scenario showed the greatest correlation with the other scenarios and with the sum of the different scenarios. The Protection V2 scenario showed less correlation and represents a more independent scenario depicting potential future stressors. Restoration and protection lists based on the Restoration V2 and Protection V2 scenario follow, showing the top 50 watersheds in each. 23 watersheds identified on the restoration list were also identified on the protection list. Of the 77 listed watersheds 52 are DOH priority watersheds and 35 belong to a Watershed Partnership.

ISLAND	WUNAME	Scores_1	Scores_2	Scores_3	equal_25_4	equal_20_5	Restoration	Restoration_2	Protection	Protection_2	Restoration_sum
Kauai	**Manoa**	1	1	1	1	1	1	1	1	0	7
Kauai	**Nawiliwili**	1	1	1	1	1	1	1	0	1	7
Kauai	**Waikomo**	1	1	1	1	1	1	1	1	1	7
Kauai	**Mahaulepu**	1	1	1	1	1	1	1	1	0	7
Maui	**Iao**	1	1	1	1	1	1	1	0	1	7
Oahu	**Anahulu**	1	1	1	1	1	1	1	1	0	7
Oahu	**Kahana**	1	1	1	1	1	1	1	1	1	7
Oahu	**Waiahole**	1	1	1	1	1	1	1	1	0	7
Oahu	**Kaalaea**	1	1	1	1	1	1	1	1	0	7
Oahu	**Kawainui**	1	1	1	1	1	1	1	1	1	7
Oahu	**Heeia**	1	1	1	1	1	1	1	1	1	7
Hawaii	**Wainaia**	0	1	1	1	1	1	1	0	0	6
Hawaii	**Kapehu**	1	0	1	1	1	1	1	1	0	6
Kauai	**Kawailoa**	0	1	1	1	1	1	1	1	0	6
Kauai	**Wahiawa**	0	1	1	1	1	1	1	1	1	6
Kauai	**Puali**	1	1	1	0	0	1	1	0	1	5
Lanai	**Paliamano**	0	1	1	1	1	1	1	1	1	6
Maui	**Maliko**	0	1	1	1	1	1	1	0	1	6
Maui	**Waiehu**	0	1	1	1	1	1	1	1	1	6
Oahu	**Kalunawaikaala**	0	1	1	1	1	1	1	1	1	6
Oahu	**Paukauila**	1	1	1	0	0	1	1	0	0	5
Oahu	**Kahaluu segment**	1	0	1	1	1	1	1	0	0	6
Oahu	**Keaahala**	1	0	1	1	1	1	1	1	1	6
Oahu	**Kaneohe**	1	0	1	1	1	1	1	1	1	6
Oahu	**Ala Wai**	1	0	1	1	1	1	1	1	1	6
Kauai	**Kauapea**	0	1	0	1	1	1	1	1	1	5
Maui	**Honokowai**	0	1	0	1	1	1	1	0	1	5
Maui	**Waihee**	0	0	1	1	1	1	1	1	0	5
Molokai	**Waialua**	1	0	1	1	1	0	1	0	0	5
Oahu	**Waikane**	0	0	1	1	1	1	1	0	0	5
Oahu	**Kawa**	1	0	1	0	0	1	1	0	0	4
Oahu	**Kaelepulu**	1	0	1	0	0	1	1	0	0	4
Hawaii	**Keahole**	0	1	1	1	1	0	0	0	1	4
Kauai	**Kilauea**	1	0	0	1	1	0	1	0	0	4
Kauai	**Hanalei**	0	0	1	1	1	0	1	1	0	4
Kauai	**Hanamaulu**	1	0	0	0	0	1	1	0	1	3
Kauai	**Huleia**	0	0	0	1	1	1	1	0	1	4
Kauai	**Aepo**	1	1	1	0	0	0	0	0	0	3
Maui	**Kahana**	0	1	0	0	0	1	1	0	1	3
Maui	**Waikapu**	0	0	0	1	1	1	1	0	1	4
Maui	**Wailea**	0	1	1	1	1	0	0	1	1	4
Molokai	**Kaunala**	1	1	1	0	0	0	0	1	0	3
Oahu	**Waimalu**	1	0	1	0	0	0	1	0	0	3
Oahu	**Kahawainui**	0	0	0	1	1	1	1	1	0	4
Oahu	**Keamanea**	1	1	1	0	0	0	0	0	0	3
Oahu	**Punaluu**	0	0	0	1	1	1	1	1	1	4
Oahu	**Poamoho**	1	1	1	0	0	0	0	0	0	3
Oahu	**Waikele**	1	0	0	0	0	1	1	0	0	3
Oahu	**Kalauao**	0	0	0	1	1	1	1	0	0	4
Oahu	**Waimanalo**	1	0	0	0	0	1	1	0	0	3
Oahu	**Nuuanu**	0	0	0	1	1	1	1	1	0	4
Oahu	**Portlock**	0	0	0	1	1	1	1	1	1	4
Hawaii	**Hapahapai**	0	1	1	0	0	0	0	0	0	2
Hawaii	**Waikoloa/Waiulaula**	0	1	1	0	0	0	0	0	1	2
Hawaii	**Alia**	0	1	0	0	0	1	0	1	0	2
Hawaii	**Papaikou**	0	1	0	0	0	1	0	0	0	2
Hawaii	**Kealakekua**	0	1	1	0	0	0	0	0	0	2
Kauai	**Limahuli**	0	0	0	1	1	0	1	0	0	3
Kauai	**Lawai**	1	0	0	0	0	1	0	0	0	2
Lanai	**Naha**	0	1	1	0	0	0	0	1	0	2
Molokai	**Kolo**	0	1	1	0	0	0	0	0	0	2
Oahu	**Loko Ea**	0	1	1	0	0	0	0	0	0	2
Oahu	**Kawaihapai**	0	1	1	0	0	0	0	0	0	2
Oahu	**Kaaawa**	0	0	0	0	0	1	1	0	0	2
Oahu	**Waiawa**	0	0	0	0	0	1	1	0	0	2
Oahu	**Halawa**	0	0	0	0	0	1	1	0	0	2

ISLAND	WUNAME	Restoration	Protection
Oahu	Kahana	0.249	0.401
Oahu	Ala Wai	0.252	0.406
Maui	Waiehu	0.282	0.318
Oahu	Kawainui	0.285	0.442
Maui	Iao	0.286	0.349
Oahu	Heeia	0.289	0.315
Oahu	Waiahole	0.312	
Oahu	Kaneohe	0.315	0.450
Oahu	Nuuanu	0.327	
Maui	Waikapu	0.345	0.388
Kauai	Waikomo	0.345	0.458
Oahu	Keaahala	0.346	0.328
Kauai	Kawailoa	0.351	
Kauai	Mahaulepu	0.353	
Kauai	Hanamaulu	0.356	0.413
Kauai	Nawiliwili	0.358	0.384
Oahu	Anahulu	0.360	
Kauai	Manoa	0.367	
Oahu	Kawa	0.368	
Lanai	Paliamano	0.369	0.390
Oahu	Kahaluu seg	0.372	
Maui	Maliko	0.377	0.378
Kauai	Huleia	0.382	0.377
Kauai	Wahiawa	0.384	0.345
Oahu	Kaalaea	0.385	
Maui	Honokowai	0.386	0.374
Oahu	Kaelepulu	0.392	
Oahu	Waikane	0.393	
Maui	Waihee	0.395	
Oahu	Kalunawaikaala	0.396	0.430
Oahu	Portlock	0.397	0.425
Oahu	Kalauao	0.401	
Kauai	Kilauea	0.402	
Maui	Kahana	0.406	0.459
Molokai	Waialua	0.409	
Hawaii	Wainaia	0.409	
Hawaii	Kapehu	0.410	
Oahu	Kahawainui	0.410	
Kauai	Limahuli	0.411	

ISLAND	WUNAME	Restoration	Protection
Oahu	Halawa	0.411	
Oahu	Paukauila	0.411	
Kauai	Hanalei	0.415	
Oahu	Waikele	0.416	
Oahu	Punaluu	0.417	0.463
Kauai	Kauapea	0.417	0.462
Kauai	Puali	0.419	0.422
Oahu	Waiawa	0.423	
Oahu	Waimanalo	0.426	
Oahu	Kaaawa	0.428	
Oahu	Waimalu	0.432	
Maui	Wailea		0.323
Hawaii	Keahole		0.343
Maui	Pohakea		0.344
Kauai	Wailua		0.346
Hawaii	Kauna		0.350
Maui	Mooloa		0.353
Hawaii	Lapakahi		0.373
Kauai	Lihue Airport		0.378
Hawaii	Waiaha		0.386
Hawaii	Wainaku		0.391
Hawaii	Kawaihae		0.392
Maui	Waiakoa		0.395
Hawaii	Pohakuloa		0.400
Maui	Wahikuli		0.407
Hawaii	Kaahakini		0.408
Hawaii	Kiholo		0.415
Hawaii	Waikoloa/Waiulaula		0.417
Hawaii	Wailoa		0.429
Hawaii	Honokohau		0.444
Maui	Kahoma		0.452
Maui	Kanaio		0.453
Maui	Kalialinui		0.455
Lanai	Kaumalapau		0.456
Oahu	Hanauma		0.458
Oahu	Makua		0.459
Oahu	Oio		0.464
Molokai	Kamalo		0.464

References

Silva L, Williams D, (2001) Buffer zone versus whole catchment approaches to studying land use impact on river water quality. Water Res 35:3462-3472

Stringfellow W, (2008) Ranking tributaries for setting remediation priorities in a TMDL context. Chemosphere 71, 1895 - 1908

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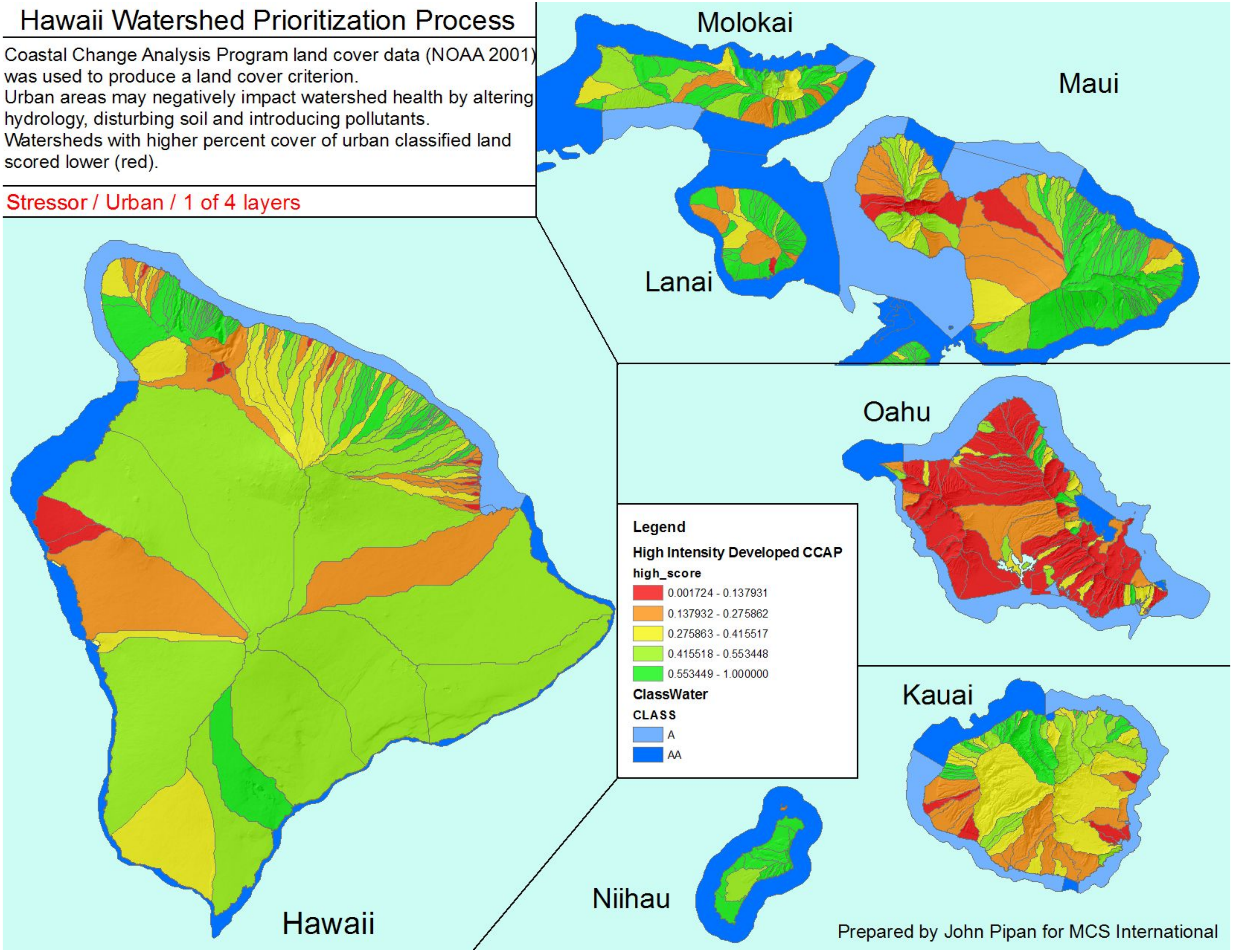
Coastal Change Analysis Program land cover data (NOAA 2001) was used to produce a land cover criterion.
Urban areas may negatively impact watershed health by altering hydrology, disturbing soil and introducing pollutants.
Watersheds with higher percent cover of urban classified land scored lower (red).

Stressor / Urban / 1 of 4 layers



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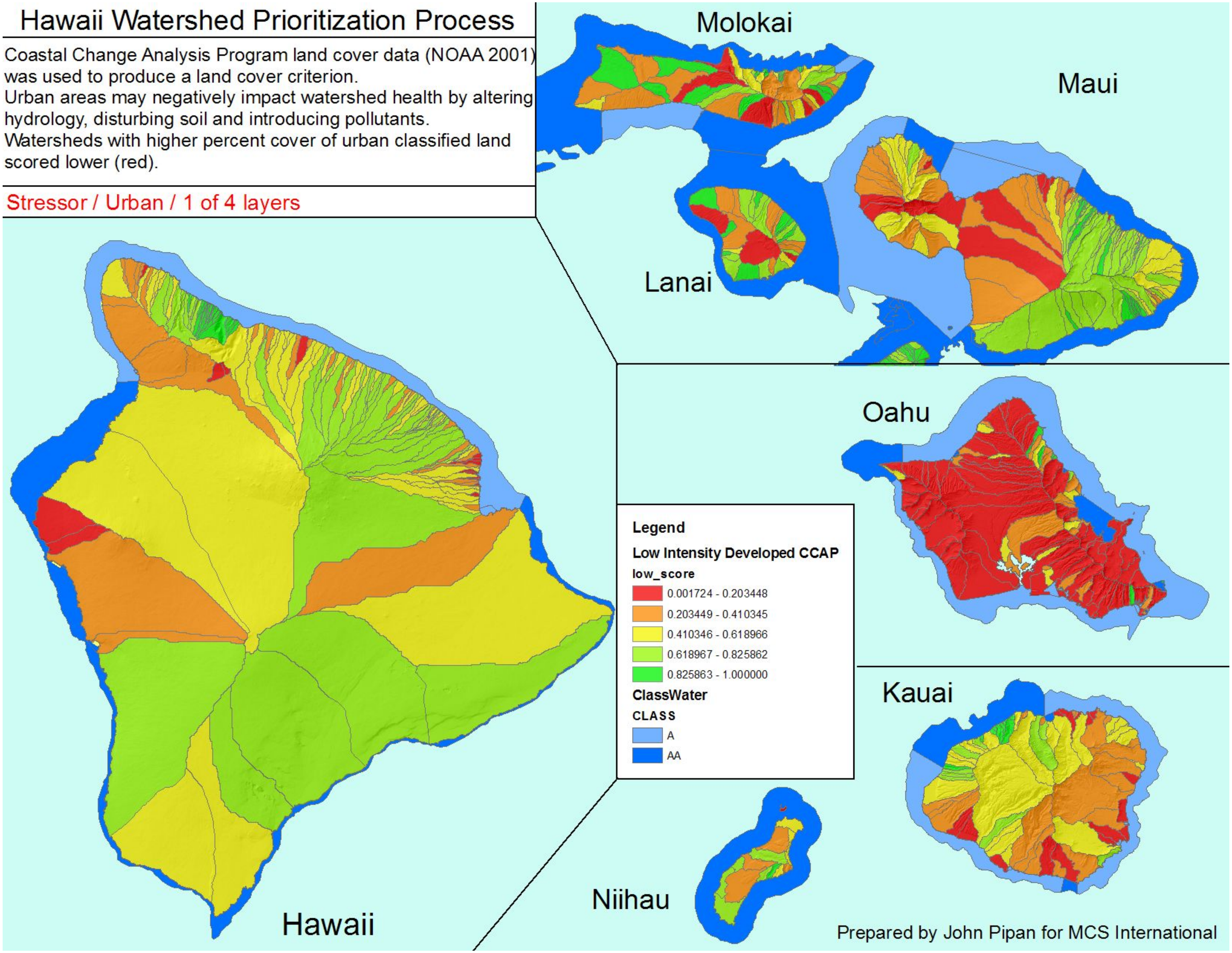
Stressor / Urban / 1 of 4 layers



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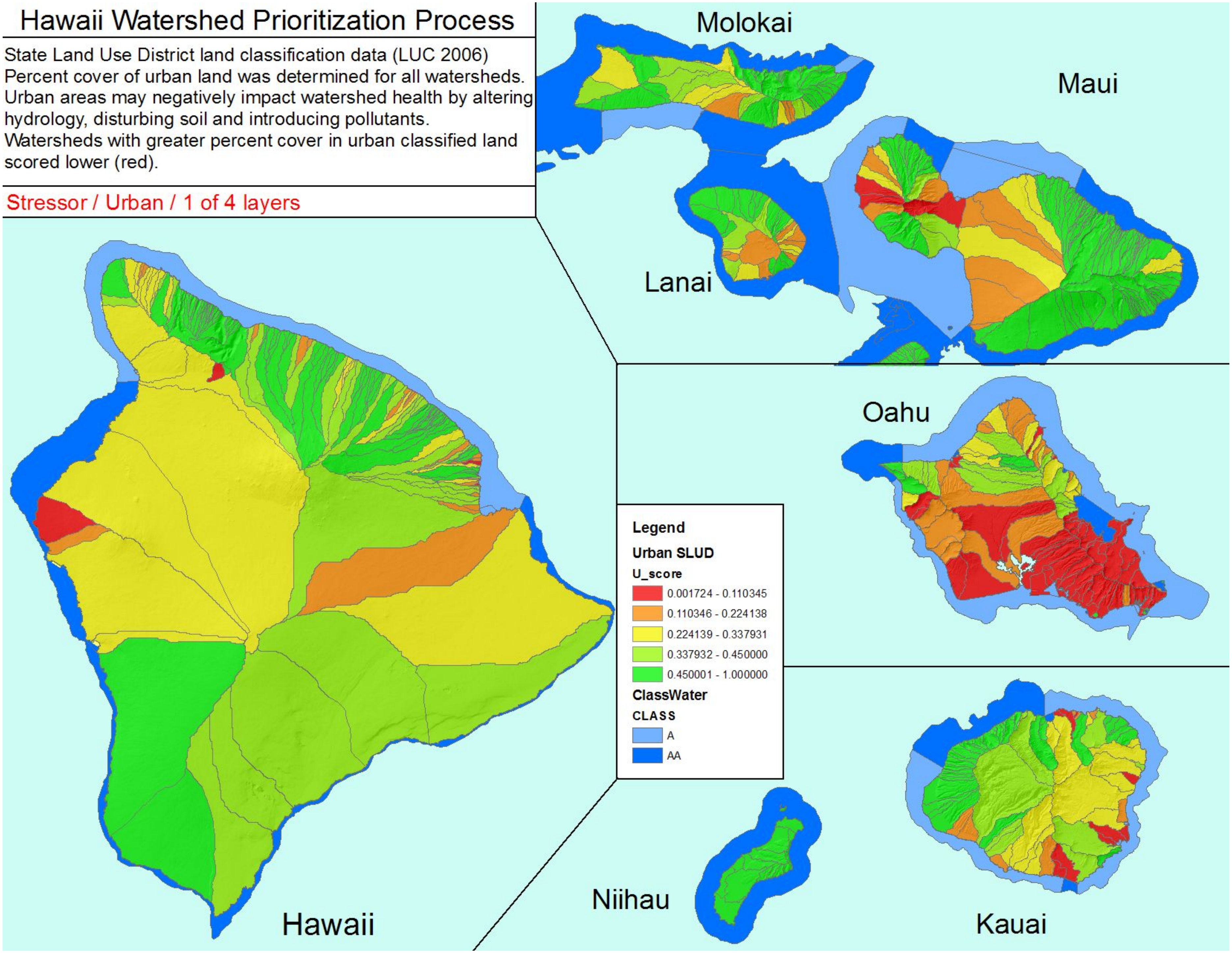
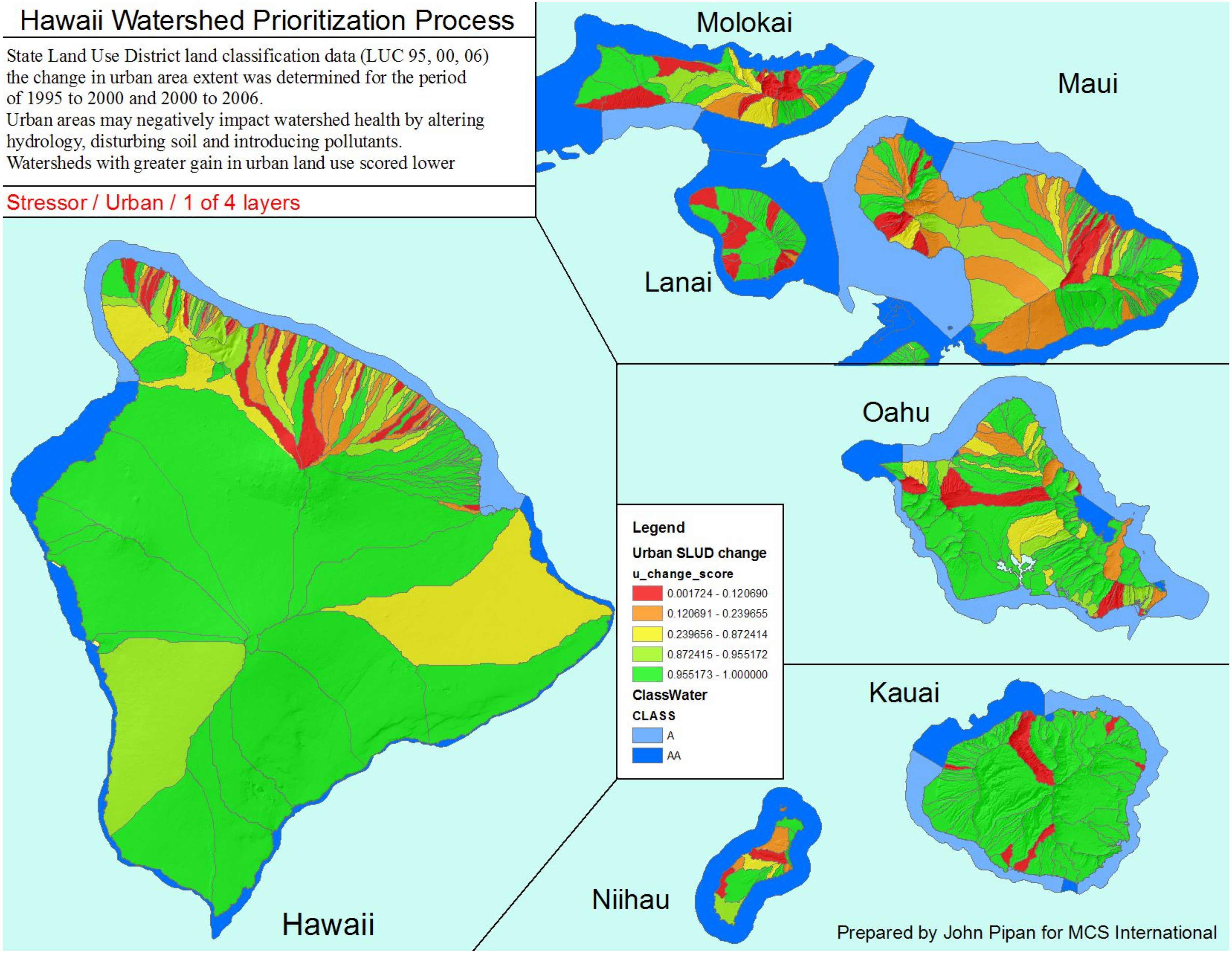
State Land Use District land classification data (LUC 2006) Percent cover of urban land was determined for all watersheds. Urban areas may negatively impact watershed health by altering hydrology, disturbing soil and introducing pollutants. Watersheds with greater percent cover in urban classified land scored lower (red).

Stressor / Urban / 1 of 4 layers

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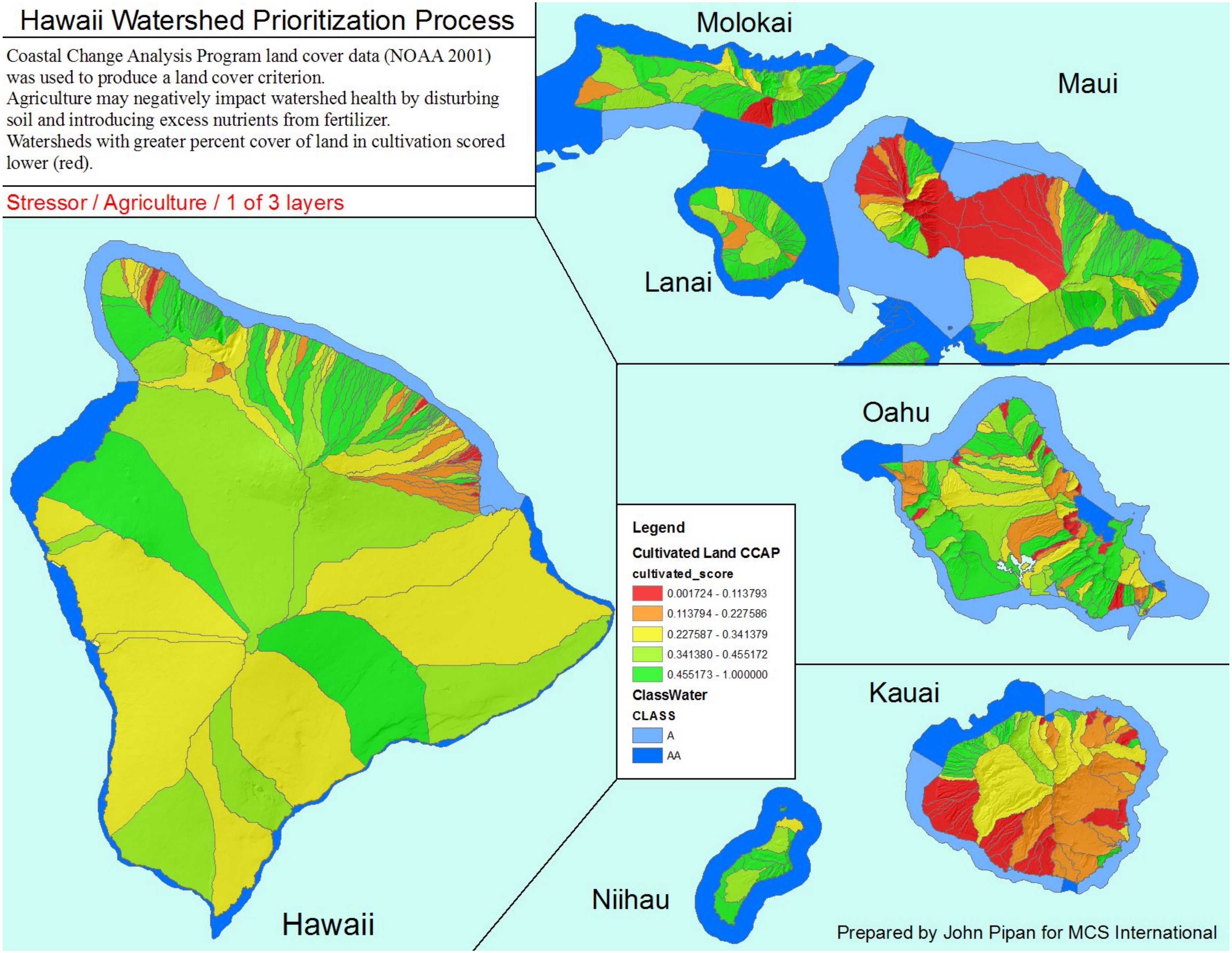
State Land Use District land classification data (LUC 95, 00, 06) the change in urban area extent was determined for the period of 1995 to 2000 and 2000 to 2006.
Urban areas may negatively impact watershed health by altering hydrology, disturbing soil and introducing pollutants.
Watersheds with greater gain in urban land use scored lower
Stressor / Urban / 1 of 4 layers
Molokai
Maui
Lanai
Oahu
Kauai
Niihau
Hawaii
Legend
Urban SLUD change
u_change_score
0.001724 - 0.120690
0.120691 - 0.239655
0.239656 - 0.872414
0.872415 - 0.955172
0.955173 - 1.000000
ClassWater
CLASS
A
AA
Prepared by John Pipan for MCS International

Hawaii Watershed Prioritization Process

Coastal Change Analysis Program land cover data (NOAA 2001) was used to produce a land cover criterion.
Agriculture may negatively impact watershed health by disturbing soil and introducing excess nutrients from fertilizer.
Watersheds with greater percent cover of land in cultivation scored lower (red).

Stressor / Agriculture / 1 of 3 layers



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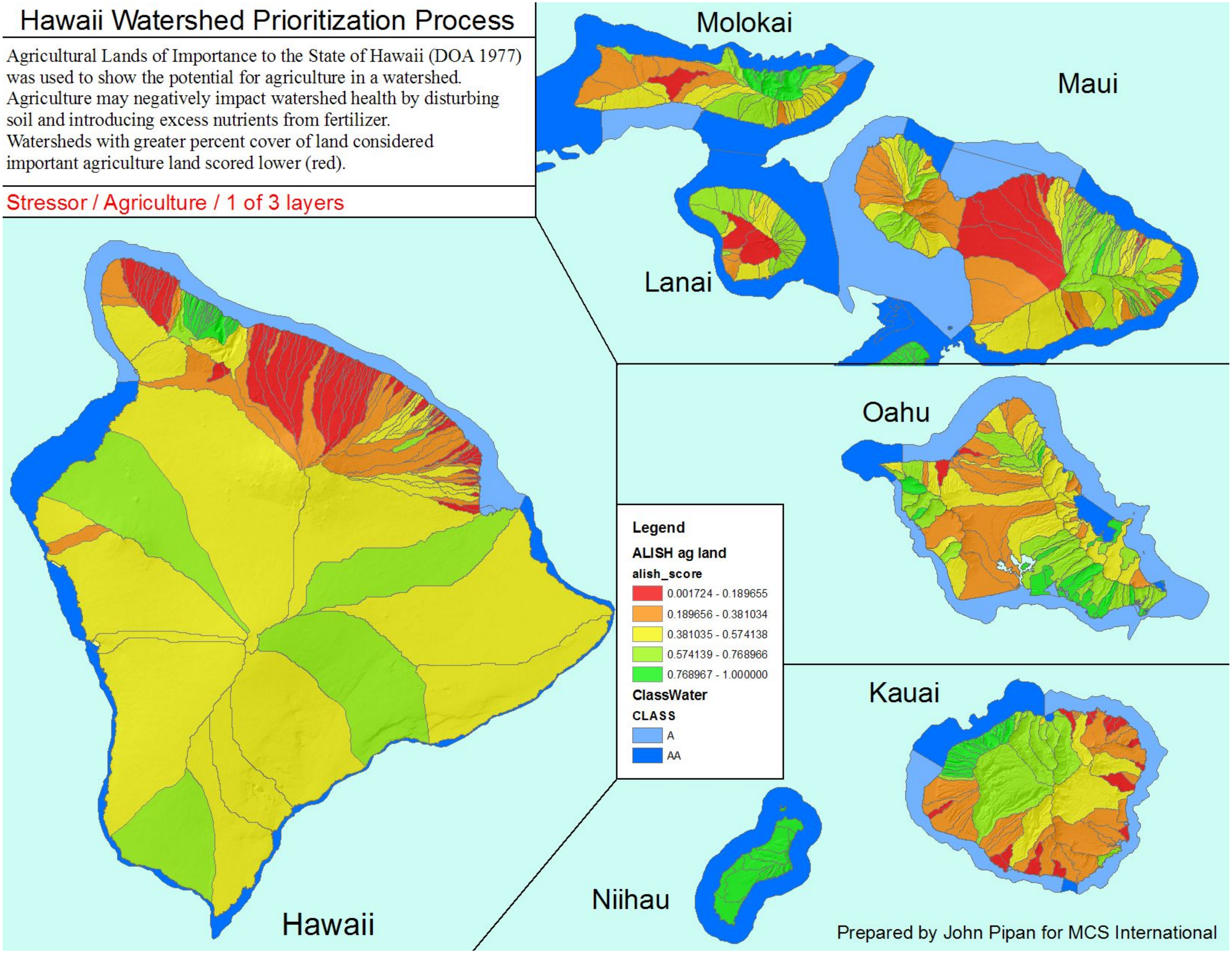
Agricultural Lands of Importance to the State of Hawaii (DOA 1977) was used to show the potential for agriculture in a watershed. Agriculture may negatively impact watershed health by disturbing soil and introducing excess nutrients from fertilizer. Watersheds with greater percent cover of land considered important agriculture land scored lower (red).

Stressor / Agriculture / 1 of 3 layers



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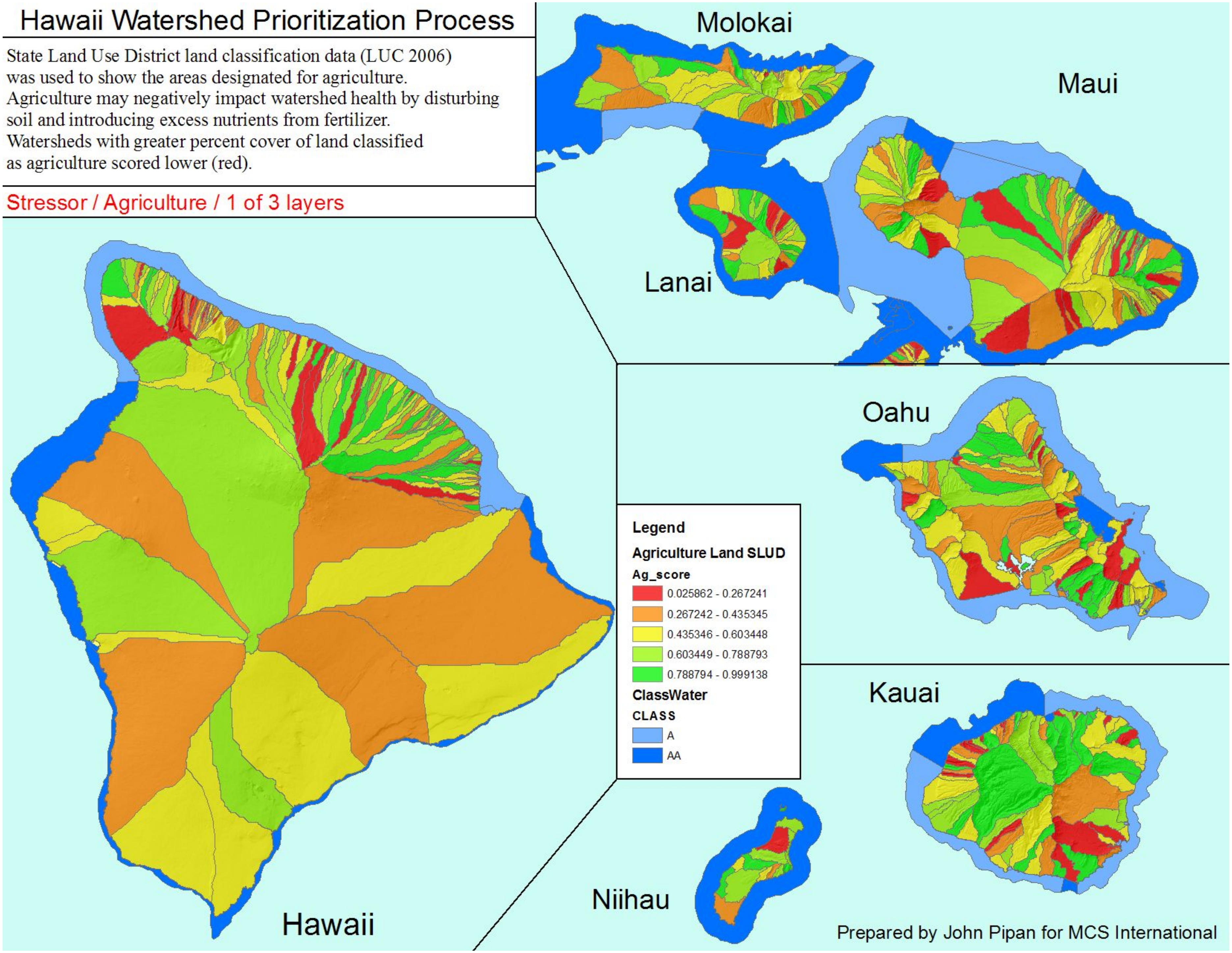
State Land Use District land classification data (LUC 2006) was used to show the areas designated for agriculture. Agriculture may negatively impact watershed health by disturbing soil and introducing excess nutrients from fertilizer. Watersheds with greater percent cover of land classified as agriculture scored lower (red).

Stressor / Agriculture / 1 of 3 layers



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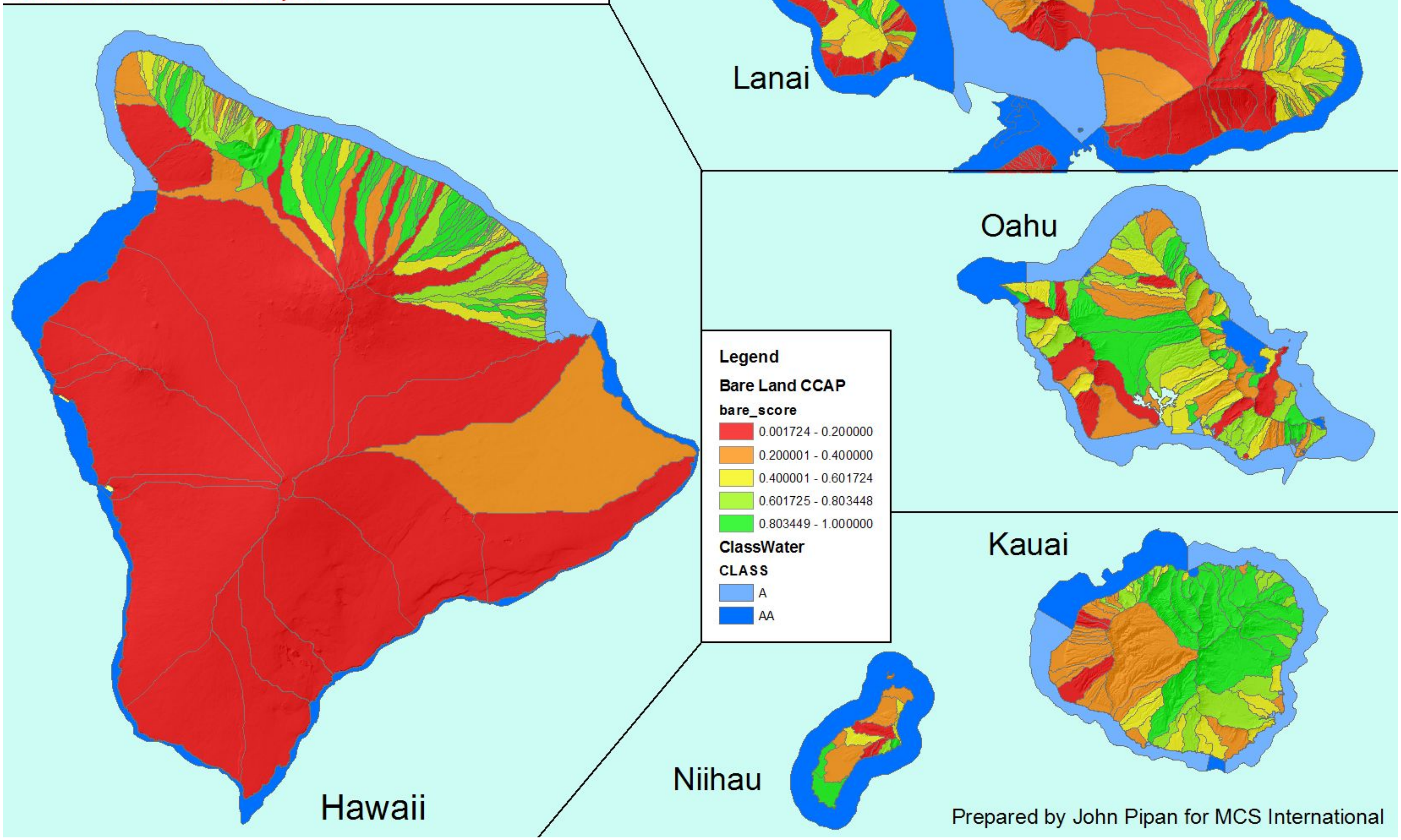
Coastal Change Analysis Program land cover data (NOAA 2001) was used to create a land cover criterion.
Bare lands, lacking vegetative cover, are susceptible to erosion. Watersheds with greater percent cover of bare classified land scored lower (red).

Stressor / Soils / 1 of 2 layers



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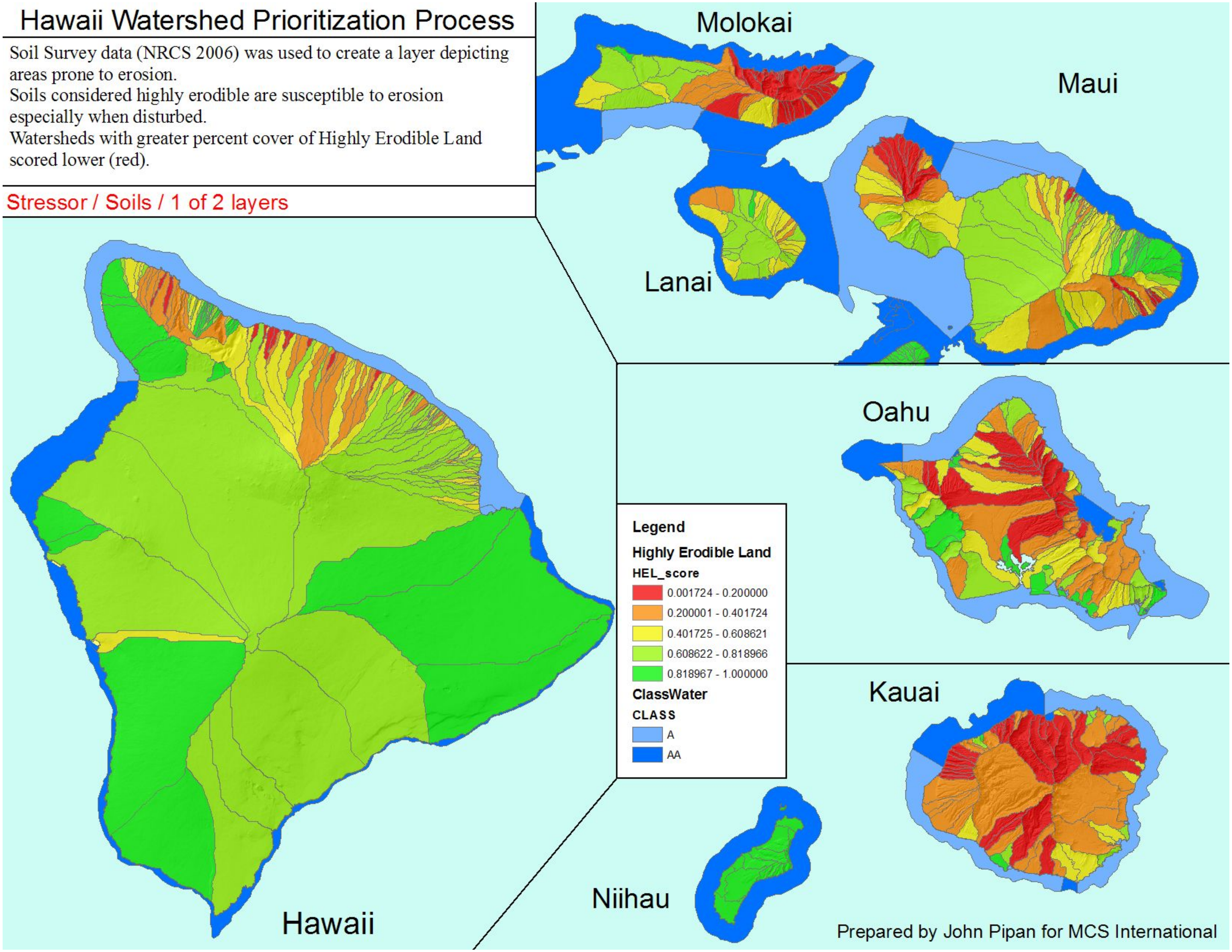
Soil Survey data (NRCS 2006) was used to create a layer depicting areas prone to erosion.
Soils considered highly erodible are susceptible to erosion especially when disturbed.
Watersheds with greater percent cover of Highly Erodible Land scored lower (red).

Stressor / Soils / 1 of 2 layers



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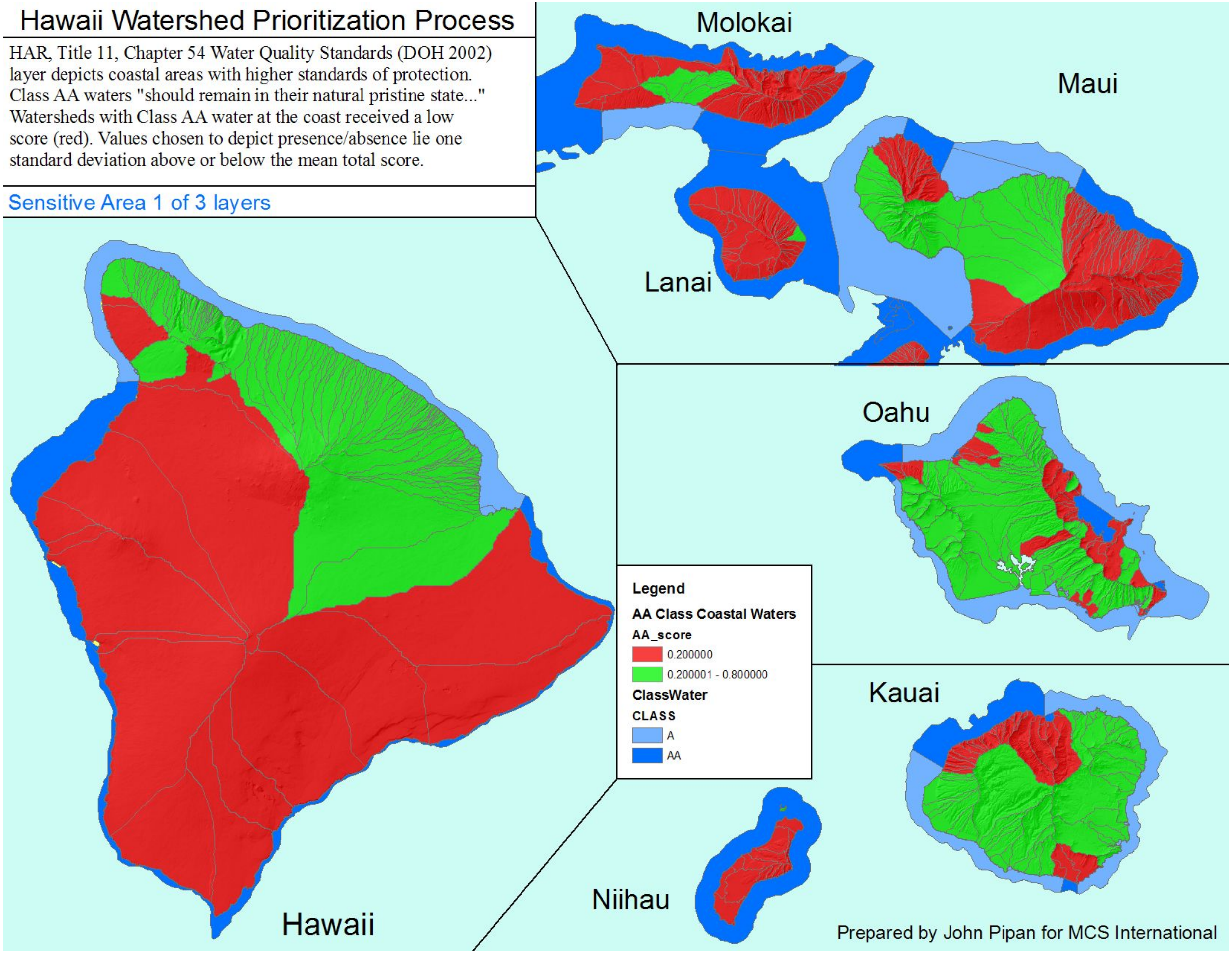
HAR, Title 11, Chapter 54 Water Quality Standards (DOH 2002) layer depicts coastal areas with higher standards of protection. Class AA waters "should remain in their natural pristine state..." Watersheds with Class AA water at the coast received a low score (red). Values chosen to depict presence/absence lie one standard deviation above or below the mean total score.

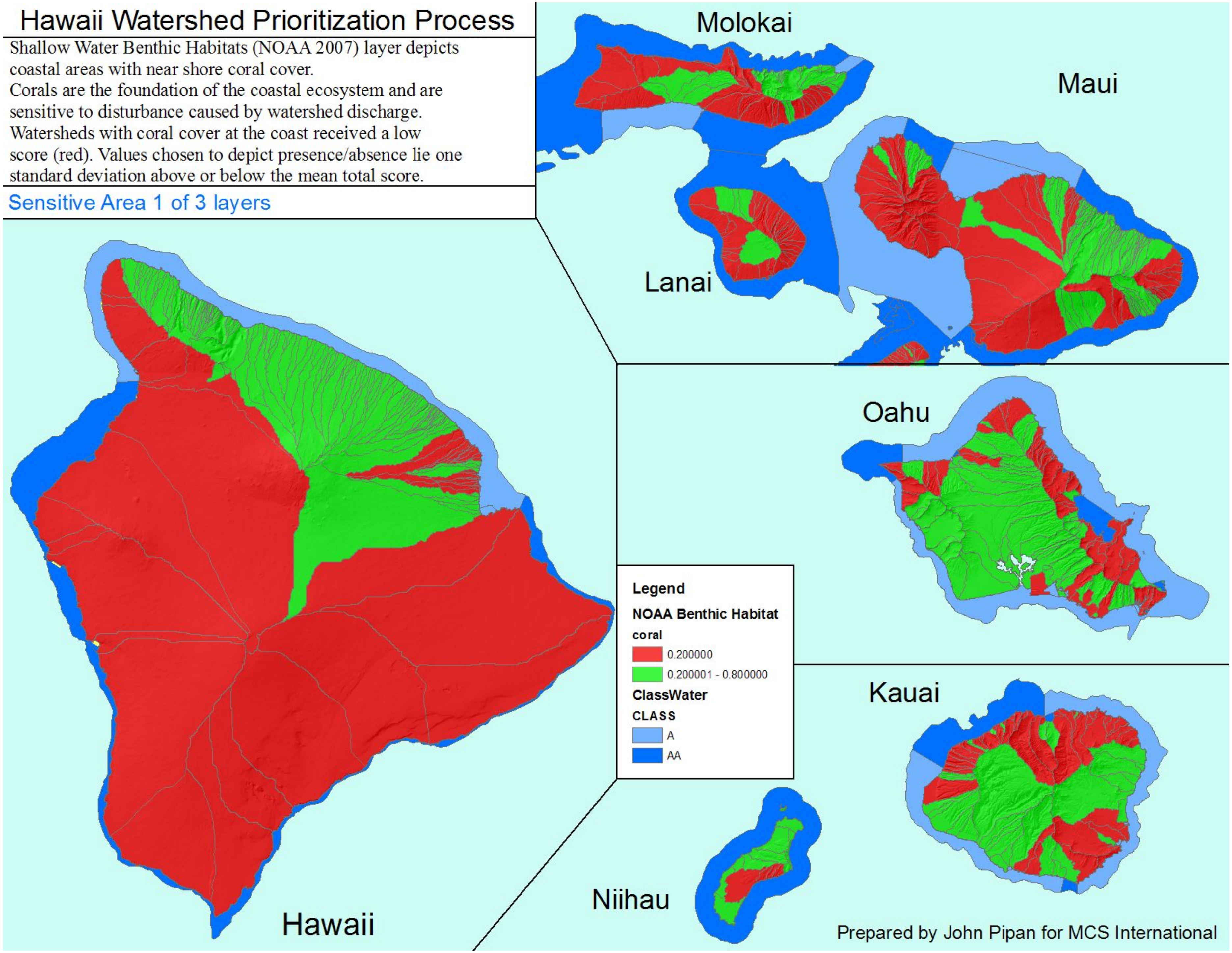
Sensitive Area 1 of 3 layers



Hawaii Watershed Prioritization Process

Shallow Water Benthic Habitats (NOAA 2007) layer depicts coastal areas with near shore coral cover.
Corals are the foundation of the coastal ecosystem and are sensitive to disturbance caused by watershed discharge.
Watersheds with coral cover at the coast received a low score (red). Values chosen to depict presence/absence lie one standard deviation above or below the mean total score.

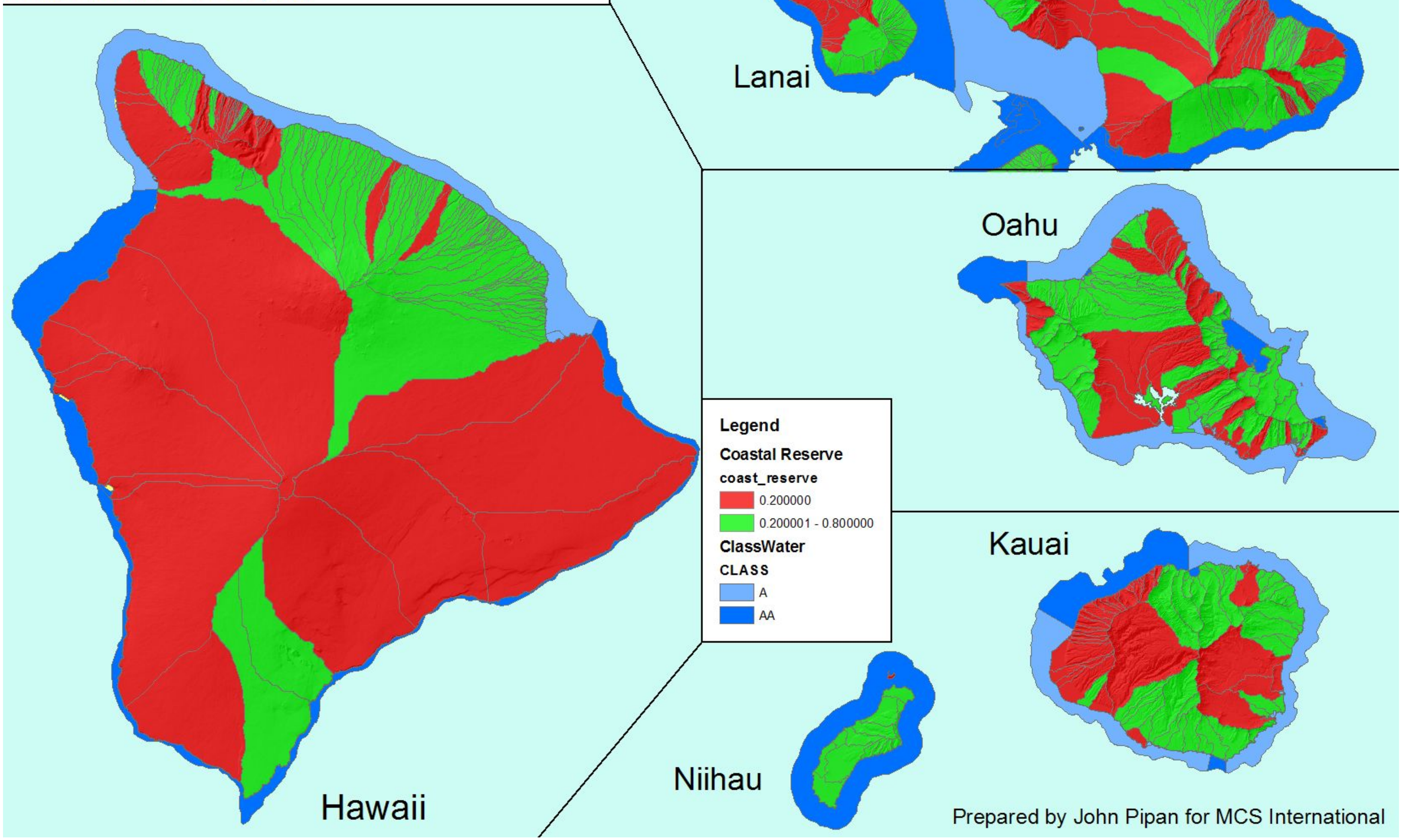
Sensitive Area 1 of 3 layers



Hawaii Watershed Prioritization Process

Reserves (SOH, DLNR, DOFAW 2002) layer depicts coastal areas with various reserves, preserves, parks, etc. The reserve areas represent different coastal uses to be protected Watersheds with reserves at the coast received a low score (red). Values chosen to depict presence/absence lie one standard deviation above or below the mean total score.

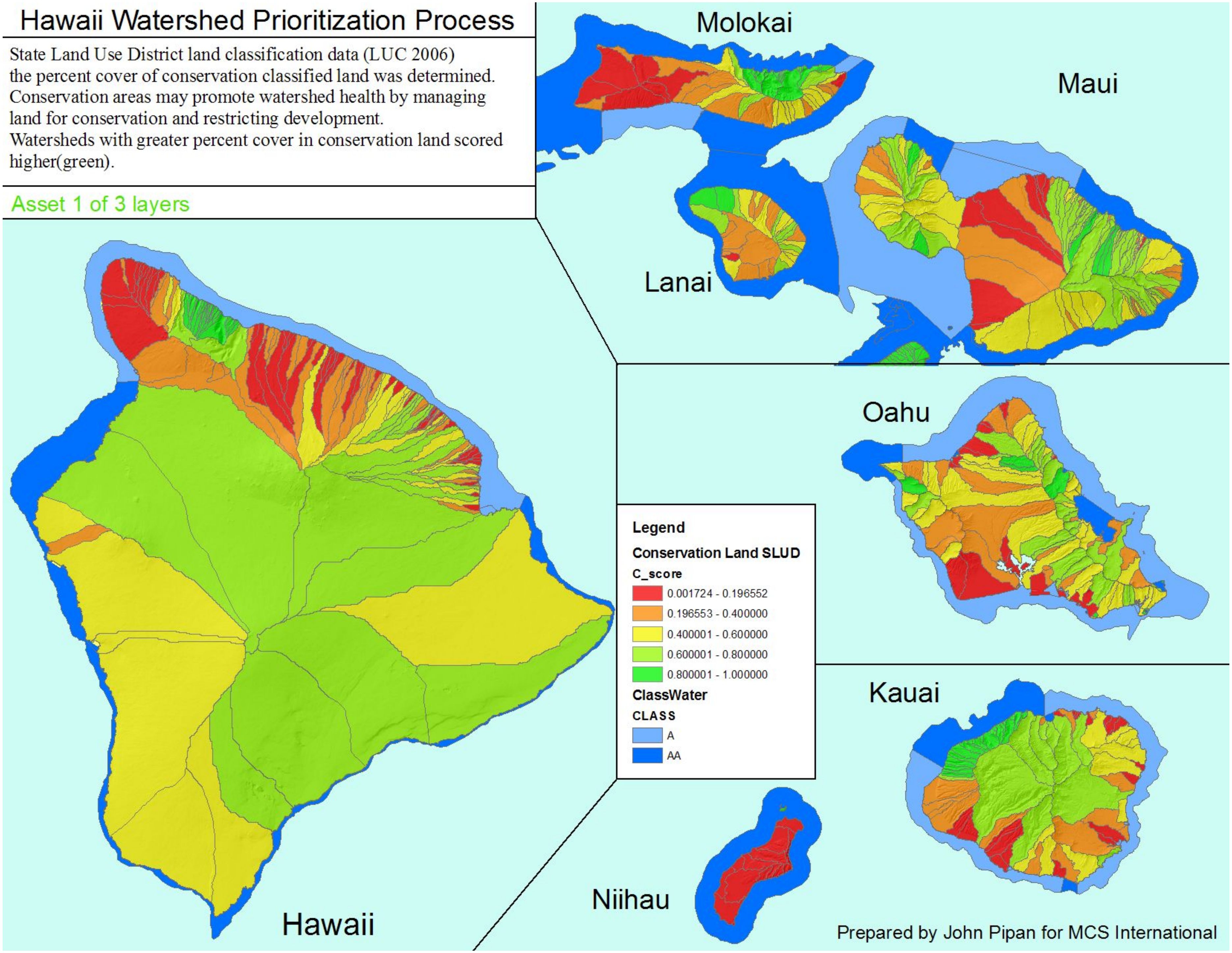
Sensitive Area 1 of 3 layers



Hawaii Watershed Prioritization Process

State Land Use District land classification data (LUC 2006) the percent cover of conservation classified land was determined. Conservation areas may promote watershed health by managing land for conservation and restricting development.
Watersheds with greater percent cover in conservation land scored higher(green).

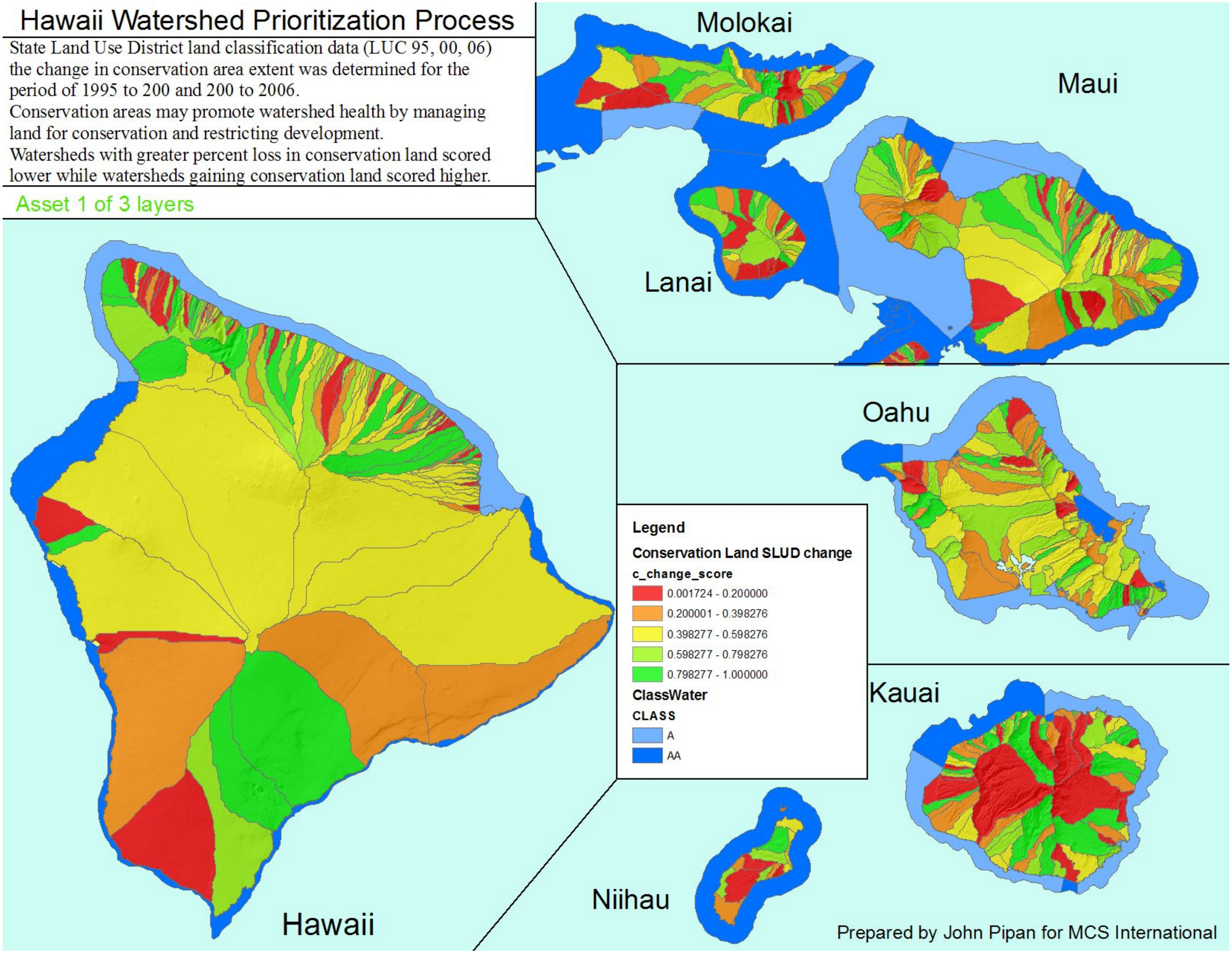
Asset 1 of 3 layers



Hawaii Watershed Prioritization Process

State Land Use District land classification data (LUC 95, 00, 06) the change in conservation area extent was determined for the period of 1995 to 200 and 200 to 2006.
Conservation areas may promote watershed health by managing land for conservation and restricting development.
Watersheds with greater percent loss in conservation land scored lower while watersheds gaining conservation land scored higher.

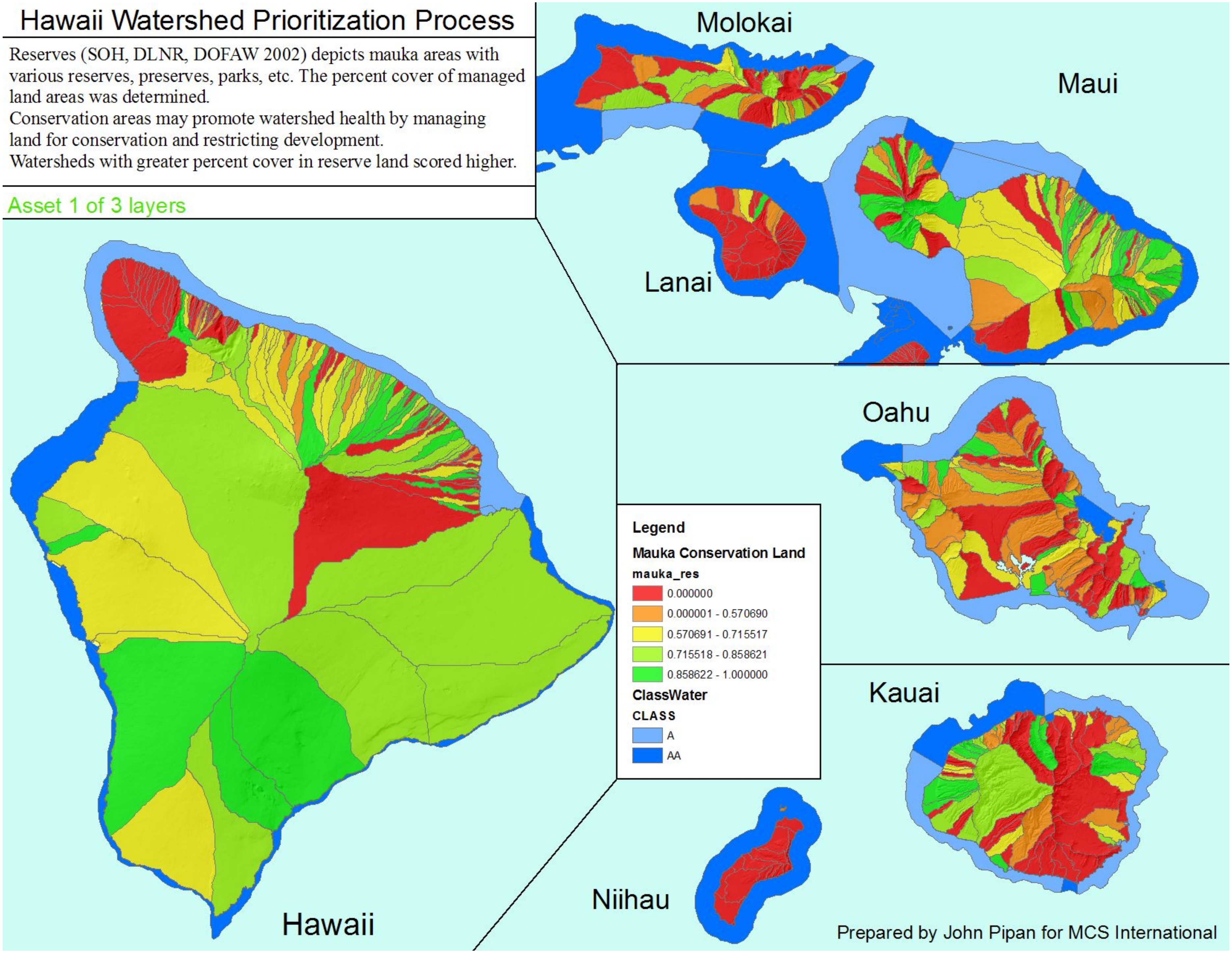
Asset 1 of 3 layers



Hawaii Watershed Prioritization Process

Reserves (SOH, DLNR, DOFAW 2002) depicts mauka areas with various reserves, preserves, parks, etc. The percent cover of managed land areas was determined.
Conservation areas may promote watershed health by managing land for conservation and restricting development.
Watersheds with greater percent cover in reserve land scored higher.

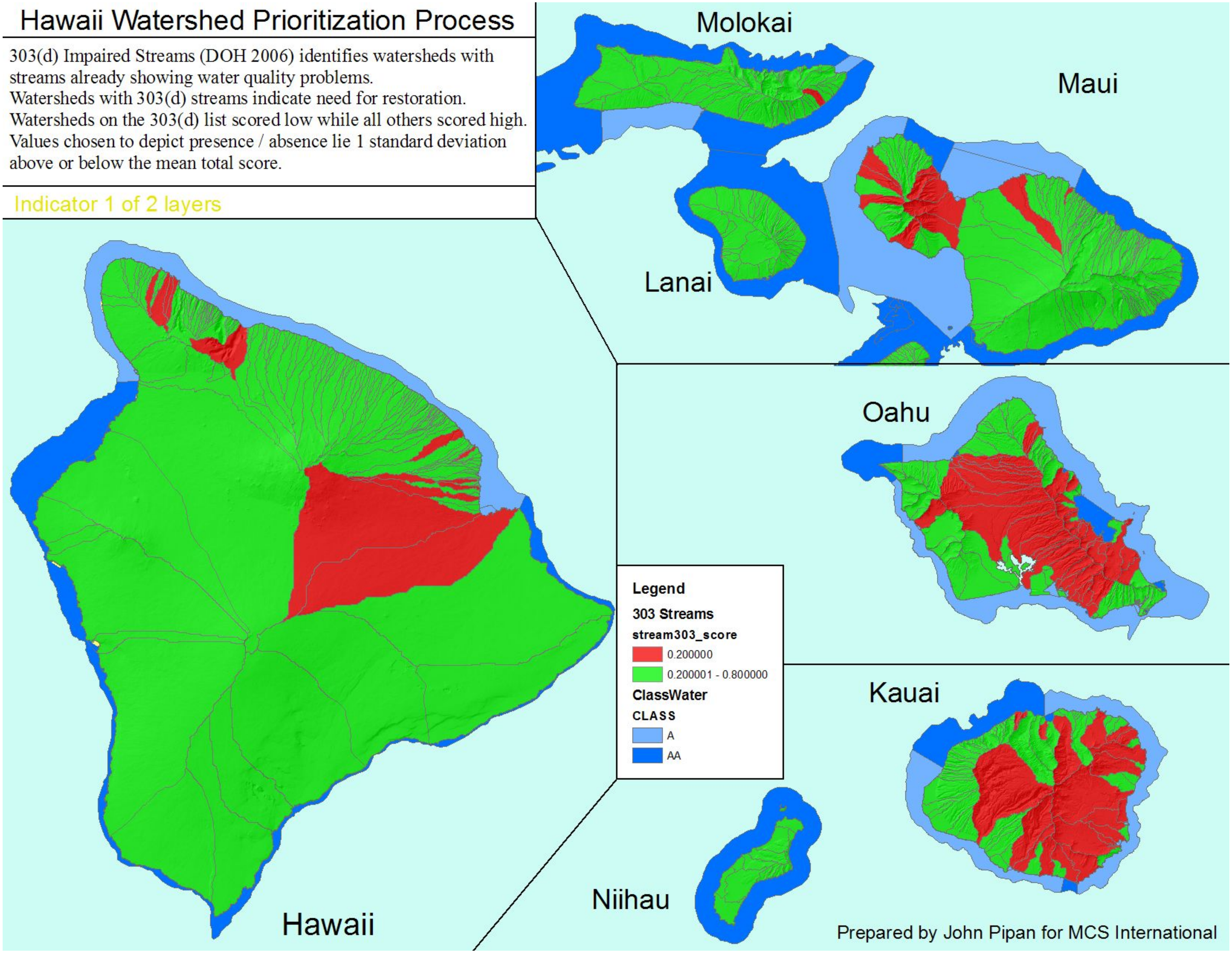
Asset 1 of 3 layers



Hawaii Watershed Prioritization Process

303(d) Impaired Streams (DOH 2006) identifies watersheds with streams already showing water quality problems.
Watersheds with 303(d) streams indicate need for restoration.
Watersheds on the 303(d) list scored low while all others scored high.
Values chosen to depict presence / absence lie 1 standard deviation above or below the mean total score.

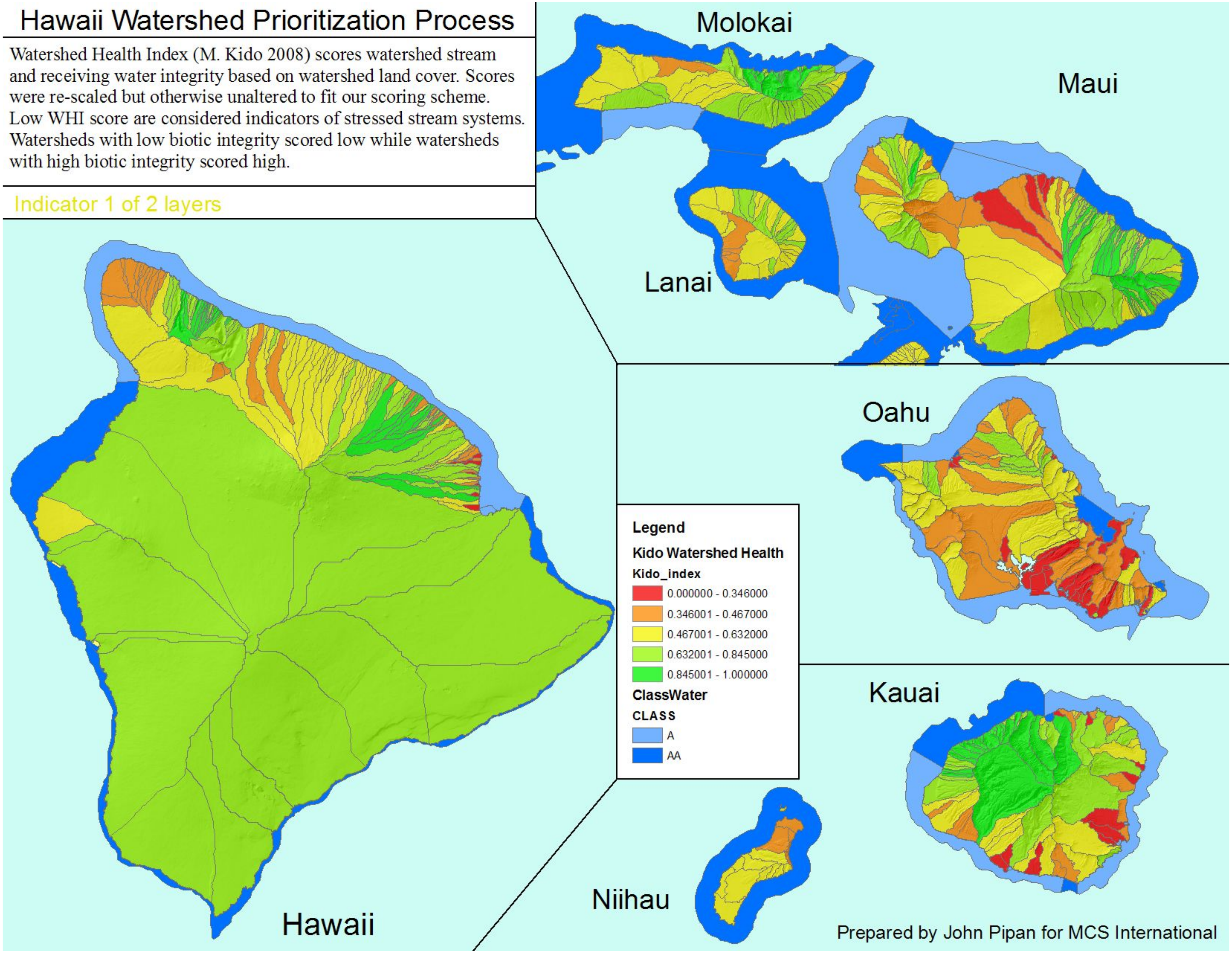
Indicator 1 of 2 layers



Hawaii Watershed Prioritization Process

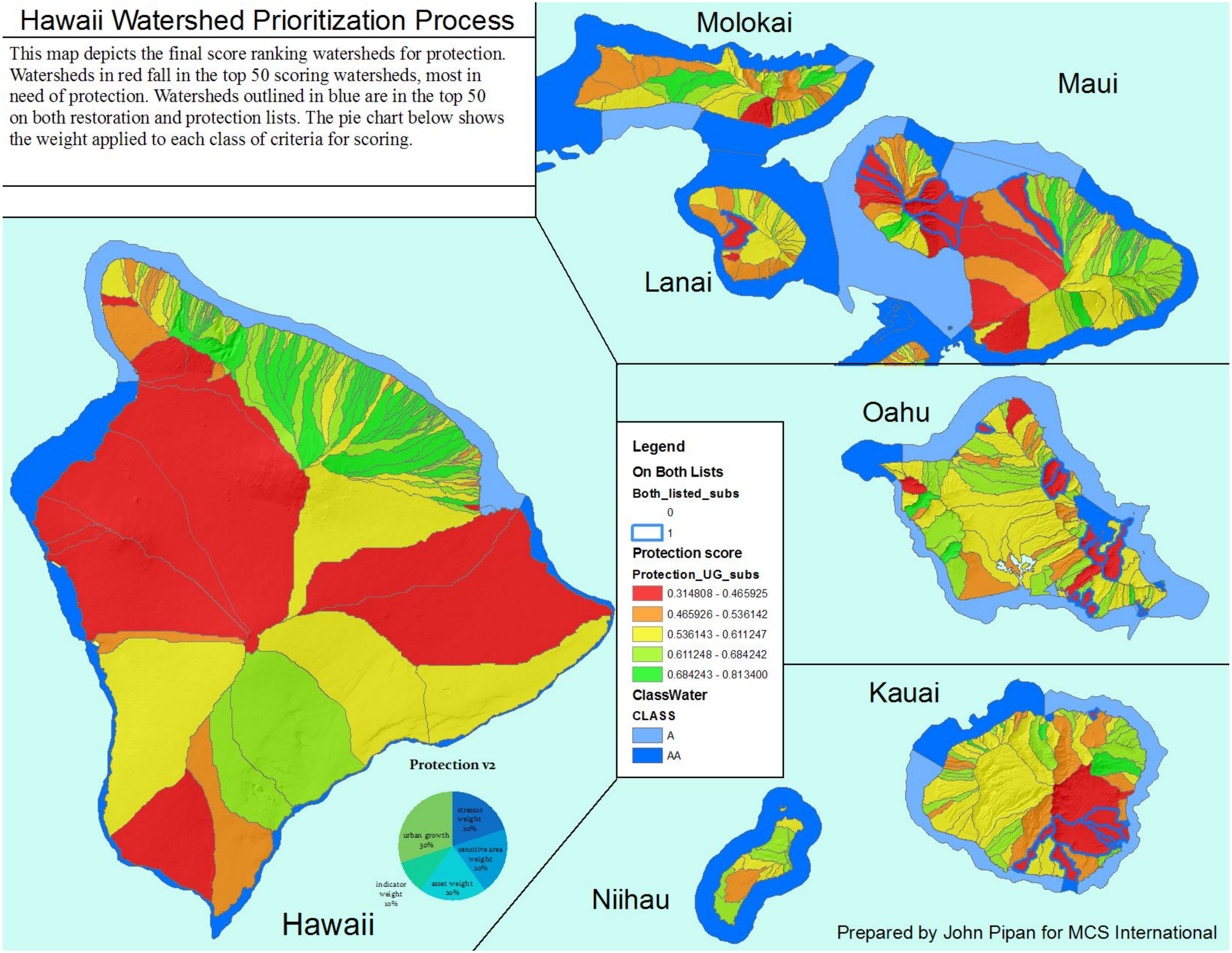
Watershed Health Index (M. Kido 2008) scores watershed stream and receiving water integrity based on watershed land cover. Scores were re-scaled but otherwise unaltered to fit our scoring scheme. Low WHI score are considered indicators of stressed stream systems. Watersheds with low biotic integrity scored low while watersheds with high biotic integrity scored high.

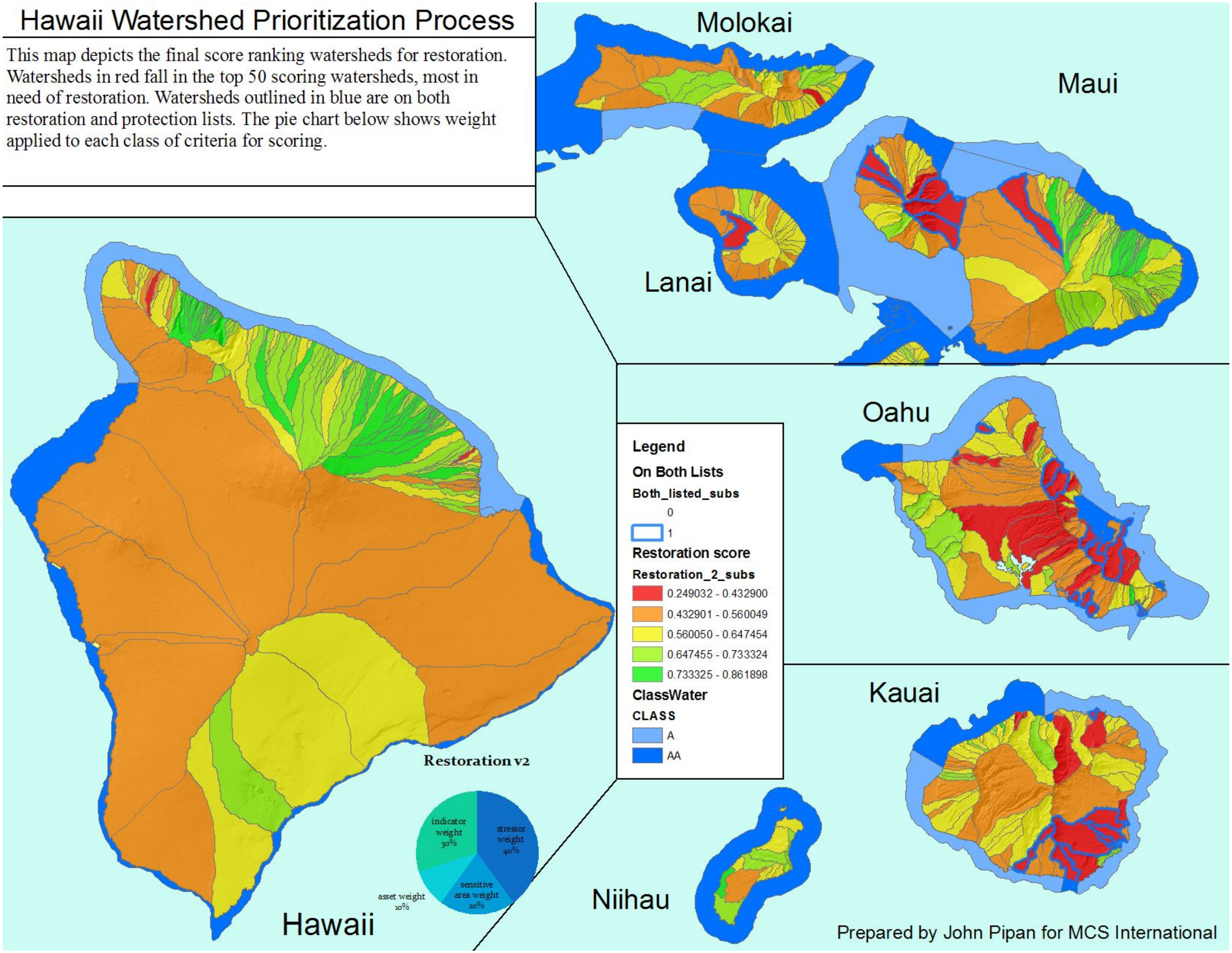
Indicator 1 of 2 layers



Hawaii Watershed Prioritization Process

This map depicts the final score ranking watersheds for protection. Watersheds in red fall in the top 50 scoring watersheds, most in need of protection. Watersheds outlined in blue are in the top 50 on both restoration and protection lists. The pie chart below shows the weight applied to each class of criteria for scoring.




Hawaii Watershed Prioritization Process
This map depicts the final score ranking watersheds for restoration. Watersheds in red fall in the top 50 scoring watersheds, most in need of restoration. Watersheds outlined in blue are on both restoration and protection lists. The pie chart below shows weight applied to each class of criteria for scoring.
Molokai
Maui
Lanai
Oahu
Kauai
Niihau
Hawaii
Legend
On Both Lists
Both_listed_subs
0
1
Restoration score
Restoration_2_subs
0.249032 - 0.432900
0.432901 - 0.560049
0.560050 - 0.647454
0.647455 - 0.733324
0.733325 - 0.861898
ClassWater
CLASS
A
AA
Restoration v2
indicator weight 30%
stressor weight 40%
sensitive area weight 20%
asset weight 10%
Prepared by John Pipan for MCS International