Developing a Standardized System for Outlining Aquaculture Management Areas

A collaborative pilot project between Sustainable Fisheries Partnership (SFP) and FAO

Background

This document outlines a process for the development of aquaculture management areas (AMAs) in locations and systems where governments have not yet devoted resources to the task. This work is not meant to replace or pre-empt specific development of AMAs – that remains a task for national governments; but it does provide a framework for a rapid global approach to identifying AMAs. This initial approach will be particularly valuable as a baseline for instituting natural resource management and shared disease risk reduction in countries with emerging aquaculture industries, where governments may not have the resources to conduct a more in-depth planning process. Where evidence-based, detailed AMAs have been developed, they will take precedence. This work also proposes the creation of a global standard nomenclature for all AMAs, to enable standardized referencing; but it has not prescribed that structure.

Aquaculture management areas are also known as zones and can be developed from a process of zoning. They provide an effective management unit that enables governments to plan for sustainable natural resource use across entire areas and to develop greater coordination and management between farms for issues like public water quality protection and improved disease control. Once identified, AMAs can be managed by farmer groups to help ensure standardized operating procedures at the farm level and to develop collaborative strategies to deal with shared risks related to disease prevention and control, as well as coordinated management of shared resources like water sources and waste channels. AMAs provide the opportunity for greater stability in the production environment and agreed action plans, in the event of disease outbreaks for example, thereby increasing the overall profitability of businesses, especially small-scale producers.

The first phase of the development process has focused on inland aquaculture, taking relevant political and natural resource boundaries into account, principally at the sub-national level, using first-tier administrative boundaries and watershed boundaries. Watershed boundaries were selected because this provided an identifiable limit to the connectivity between aquaculture operations. This initial model has utilized major watersheds, but greater granularity may be required in specific locations – especially where aquaculture is a significant industry. Watershed boundaries were overlaid onto the administrative boundaries.

The examples from Thailand and Indonesia require validation and comparison against any work already conducted by national governments and will need

refining depending upon where existing farms are located in relation to the identified AMAs.

In a second (future) phase of this work, a similar approach is required for the marine environment, and should be developed taking into account relevant maritime (e.g. exclusive economic zones) and natural resource boundaries, based on hydrographic criteria.

Methodology

A basic methodology for mapping AMAs has been developed and pilot tested in Thailand and Indonesia. The methodology and initial results are described herein.

The methodology seeks to map first-tier administrative boundaries against watershed boundaries, in an effort to identify approximate aquaculture management areas. The layer units that were used in the mapping were from open-source, international databases and included: 1) administrative boundaries from the Global Administrative Areas database (http://www.gadm.org), and 2) watershed delineations from FAO's Aquastat database (http://www.fao.org/nr/water/aquastat/maps/index.stm)

The data obtained from the GADM database include countries and lower-level subdivisions (namely first-tier administrative units, but variable depending on country), and for each area provide some attributes, such as the name and variant names.

The watershed delineations were obtained from the Asia River Basin dataset of the FAO's Aquastat database. As with the administrative boundaries, the information on water basins (MAJ name) and rivers (Sub Name) was recorded and followed when developing the AMA unit IDs.

Given the variability in naming and identification tags for different political boundaries, a final ID for each unit identified through the mapping was defined. As shown in the example mapping for Indonesia (Appendix A), the alpha-numeric codes of political subdivisions from ISO 3166-2 and the name of the watercourses were used to define a new numerical ID for each layer created by the mapping project.

The geoprocessing to obtain the management unit layers was made following these steps:

Step 1 – Identifying watersheds at the country level

The Asia River Basin shapefile was clipped onto a base map containing country-level boundary lines (Level 0 in ISO 3166-2). From this, the major country watersheds were identified by selecting the original data field "*MAJ name*" from the attributes table. A new shapefile was created for each of the country watersheds identified.

Step 2 – Identifying watersheds at the provincial level

The country-level watershed shapefiles created in Step 1 were overlaid onto a map of provincial boundaries (Level 1 in ISO 3166-2). The clip function was used to create a new layer for each unique province-watershed combination. In cases where more than one watershed mapped to a province, multiple new layers were created for that province. As a result, each new watershed layer preserves its original features, but their extension is defined by the provincial boundaries.

Step 3 – From watersheds to rivers

A watershed can be defined at the provincial level, but this normally includes numerous river tributaries, some of which are not connected. To obtain more detailed areas, the watershed layer was split into the watercourses that formed the waterbasin. Utilizing the selection attributes tool and identifying the original data field "*SUB Name*" from the attributes table, a group of new layers was created.

Step 4 – Identifying rivers at the regency level

The rivers layers created in Step 3 were overlaid with the regency boundaries (Level 2 in ISO 3166-2). Once the rivers for each regency were identified, these layers were clipped with the regency boundary layers.

Step 5 – Final layers

The final step was to combine each defined river layer with the administrative boundaries level layer. Previously, the boundaries data, originally polygons, were converted to lineal shapefiles. With the same geometry, the layers can be joined. The union spatially combines these two data layers, preserving the features from both layers.

The AMAs defined for the three major Islands of Indonesia (Sumatra, Java, and Sulawesi) using the methodology outlined above are shown as figures in the following pages (Figure 1, Figure 2, and Figure 3). The tables following each figure (Table 1, Table 2, and Table 3) show how each AMA ID number was derived using a combination of the alpha-numeric codes for the administrative boundaries (at the provincial and regency levels) and rivers included to create the final layers.

Appendix A – Examples of mapping aquaculture management areas (AMAs) in Indonesia

Sumatra

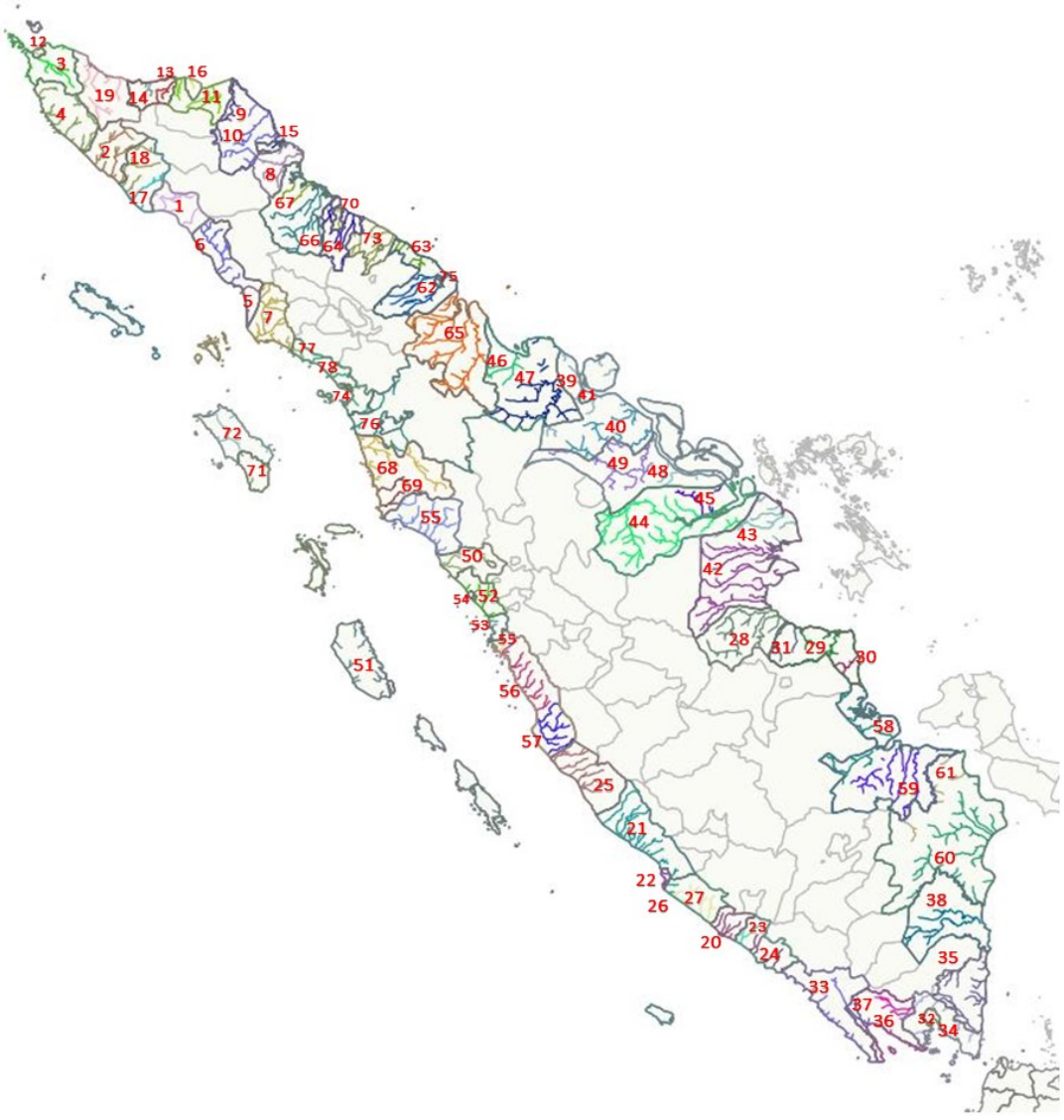

Figure 1: Map of proposed aquaculture management areas (AMAs) in Sumatra, Indonesia, derived by overlaying administrative boundaries with watershed boundaries in GIS.

Table 1: Data fields used to assign the numerical ID codes for identified aquaculture management areas (AMAs) in Sumatra, Indonesia.

ID_AMA	Province	Regency	River/Watercourse	COD ISO	
				Number	Acronimus
1	Aceh	Barat Daya	Tripa	1	AC_AD
2	Aceh	Aceh Barat	Wolya	2	AC_AB
3	Aceh	Aceh Besar	Teunom	3	AC_AR
4	Aceh	Aceh Jaya	Teunom	4	AC_AJ
5	Aceh	Aceh Selatan	Geumapang	5	AC_AS
6	Aceh	Aceh Selatan	Tripa	5	AC_AS
7	Aceh	Aceh Singkil	Geumapang	6	AC_AK
8	Aceh	Aceh Tamiang	Tamiang	7	AC_AM
9	Aceh	Aceh Timur	Jamboaye	10	AC_AI
10	Aceh	Aceh Timur	Tamiang	10	AC_AI
11	Aceh	Aceh Utara	Jamboaye	11	AC_AU
12	Aceh	Banda Aceh	Teunom	12	AC_BA
13	Aceh	Bireuen	Jamboaye	14	AC_BI
14	Aceh	Bireuen	Teunom	14	AC_BI
15	Aceh	Langsa	Tamiang	16	AC_LA
16	Aceh	Lhokseumawe	Jamboaye	17	AC_LH
17	Aceh	Nagan Raya	Tripa	18	AC_NR
18	Aceh	Nagan Raya	Wolya	18	AC_NR
19	Aceh	Pidie	Teunom	19	AC_PI
20	Bengkulu	Bengkulu Selatan	West Coast 7	44	BE_BS
21	Bengkulu	Bengkulu Utara	West Coast 6	45	BE_BU
22	Bengkulu	Bengkulu	West Coast 6	46	BE_BE
23	Bengkulu	Kaur	West Coast 7	47	BE_KA
24	Bengkulu	Kaur	West Coast 8	47	BE_KA
25	Bengkulu	Mukomuko	West Coast 5	50	BE_MU
26	Bengkulu	Seluma	West Coast 6	52	BE_SE
27	Bengkulu	Seluma	West Coast 7	52	BE_SE
28	Jambi	Tanjung Jabung Barat	Indragiri	80	JA_TJ
29	Jambi	Tanjung Jabung Timur	Batanghari	81	JA_TT
30	Jambi	Tanjung Jabung Timur	East Coast	81	JA_TT
31	Jambi	Tanjung Jabung Timur	Indragiri	81	JA_TT
32	Lampung	Bandar Lampung		242	LA_BL
33	Lampung	Lampung Barat	West Coast 9	243	LA_LB
34	Lampung	Lampung Selatan	Seputih	244	LA_LS
35	Lampung	Lampung Timur	Seputih	246	LA_LI
36	Lampung	Tanggamus	Seputih	249	LA_TA
37	Lampung	Tulang Bawang	Tulangbawang	250	LA_TB
38	Riau	Bengkalis	Rokan	313	RI_BE
39	Riau	Bengkalis	Siak Tapung	313	RI_BE
40	Riau	Dumai		314	RI_DU
41	Riau	Indragiri Hilir	Indragiri	315	RI_II
42	Riau	Indragiri Hilir	Kamparkiri	315	RI_II
43	Riau	Pelalawan	Kamparkiri	320	RI_PE
44	Riau	Pelalawan	Selat Panjang	320	RI_PE
45	Riau	Rokan Hilir	East Coast 2	321	RI_RI
46	Riau	Rokan Hilir	Rokan	321	RI_RI
47	Riau	Siak	Selat Panjang	323	RI_SI
48	Riau	Siak	Siak Tapung	323	RI_SI

ID_AMA	Province	Regency	River/Watercourse	COD ISO	
				Number	Acronimus
51	Sumatera Barat	Padang Pariaman	West Coast 3	388	SB_PP
52	Sumatera Barat	Padang	West Coast 3	389	SB_PD
53	Sumatera Barat	Pariaman	West Coast 3	390	SB_PA
54	Sumatera Barat	Pasaman Barat	West Coast 2	391	SB_PB
55	Sumatera Barat	Pesisir Selatan	West Coast 3	394	SB_PS
56	Sumatera Barat	Pesisir Selatan	West Coast 4	394	SB_PS
57	Sumatera Barat	Pesisir Selatan	West Coast 5	394	SB_PS
58	Sumatera Selatan	Banyuasin	East Coast 3	400	SL_BA
59	Sumatera Selatan	Banyuasin	Musi Delta	400	SL_BA
60	Sumatera Selatan	Ogan Komerin Ilir	Mesuji	407	SL_OH
61	Sumatera Selatan	Ogan Komerin Ilir	Musi Delta	407	SL_OH
62	Sumatera Utara	Asahan	Asahan	414	SU_AS
63	Sumatera Utara	Asahan	East Coast 1	414	SU_AS
64	Sumatera Utara	Deli Serdang	East Coast 1	417	SU_DS
65	Sumatera Utara	Labuhan Batu	East Coast 2	420	SU_LB
66	Sumatera Utara	Langkat	East Coast 1	422	SU_LA
67	Sumatera Utara	Langkat	Tamiang	422	SU_LA
68	Sumatera Utara	Mandailing Natal	West Coast1	423	SU_MN
69	Sumatera Utara	Mandailing Natal	West Coast2	423	SU_MN
70	Sumatera Utara	Medan	East Coast 1	424	SU_ME
71	Sumatera Utara	Nias Selatan	Nias Island	425	SU_NS
72	Sumatera Utara	Nias	Nias Island	426	SU_NI
73	Sumatera Utara	Serdang Bedagai	East Coast 1	431	SU_SD
74	Sumatera Utara	Sibolga	West Coast 1	432	SU_SB
75	Sumatera Utara	Tanjung Balai	Asahan	434	SU_TB
76	Sumatera Utara	Tapanuli Selatan	West Coast 1	435	SU_ST
77	Sumatera Utara	Tapanuli Tengah	Geumapang	436	SU_TT
78	Sumatera Utara	Tapanuli Tengah	West Coast 1	436	SU_TT

Java

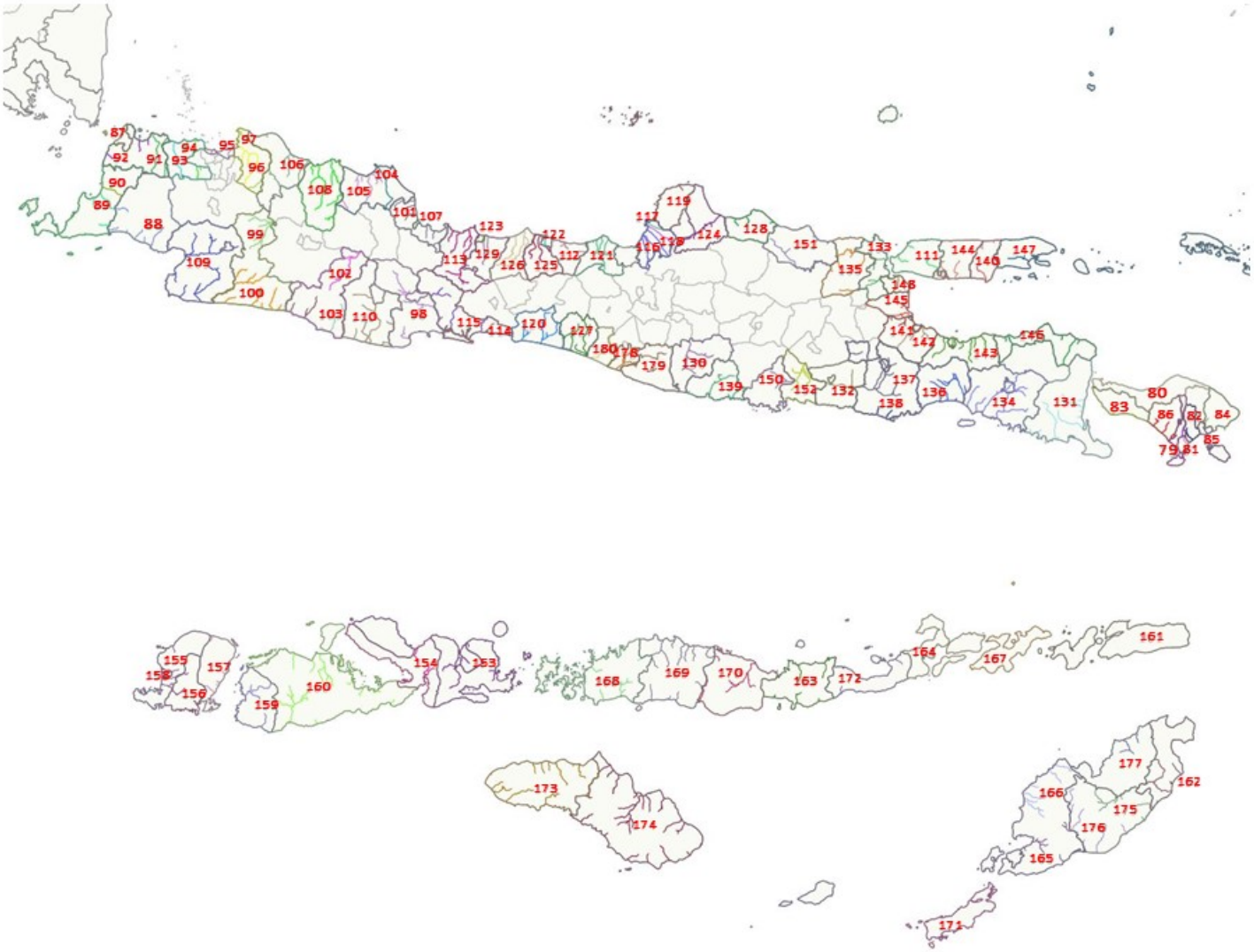

Figure 2: Map of proposed aquaculture management areas (AMAs) in Java, Indonesia, derived by overlaying administrative boundaries with watershed boundaries in GIS.

Table 2: Data fields used to assign the numerical ID codes for identified aquaculture management areas (AMAs) in Java, Indonesia.

ID_AMA	Province	Regency	River/Watercourse	COD ISO	
				Number	Acronimus
79	Bali	Badung	Bali Island	22	BA_BD
80	Bali	Buleleng	Bali Island	24	BA_BL
81	Bali	Denpasar	Bali Island	25	BA_DE
82	Bali	Gianyar	Bali Island	26	BA_GI
83	Bali	Jembrana	Bali Island	27	BA_JE
84	Bali	Karang Asem	Bali Island	28	BA_KA
85	Bali	Klungkung	Bali Island	29	BA_KL
86	Bali	Tabanan	Bali Island	30	BA_TA
87	Banten	Cilegon		38	BT_CL
88	Banten	Lebak	Cuburii	40	BT_LE
89	Banten	Pandeglang	Cuburii	41	BT_PA
90	Banten	Pandeglang	Java West Coast	41	BT_PA

ID_AMA	Province	Regency	River/Watercourse	COD ISO	
				Number	Acronimus
91	Banten	Serang	Cidurian	42	BT_SE
92	Banten	Serang	Java West Coast	42	BT_SE
93	Banten	Tangerang	Cidurian	43	BT_TR
94	Banten	Tangerang	Cisadane	43	BT_TR
95	Jakarta Raya	Jakarta Utara	Cisadane	72	JK_JU
96	Jawa Barat	Bekasi	Cisadane	85	JR_BS
97	Jawa Barat	Bekasi	Citarum	85	JR_BS
98	Jawa Barat	Ciamis	Citandury	87	JR_CS
99	Jawa Barat	Cianjur	Citarum	88	JR_CJ
100	Jawa Barat	Cianjur	Cuburii	88	JR_CJ
101	Jawa Barat	Cirebon	Central Java North Coast	90	JR_CR
102	Jawa Barat	Garut	Chimanuk	92	JR_GA
103	Jawa Barat	Garut	Ci Medang	92	JR_GA
104	Jawa Barat	Indramayu	Chimanuk	93	JR_IN
105	Jawa Barat	Indramayu	Citarum	93	JR_IN
106	Jawa Barat	Karawang	Citarum	94	JR_KA
107	Jawa Barat	Kota Cirebon		95	JR_CM
108	Jawa Barat	Subang	Citarum	104	JR_SB
109	Jawa Barat	Sukabumi	Cuburii	105	JR_SR
110	Jawa Barat	Tasikmalaya	Ci Medang	107	JR_TA
111	Jawa Timur	Bangkalan	Solo	106	JI_BK
112	Jawa Tengah	Batang	Central Java North Coast	110	JT_BT
113	Jawa Tengah	Brebes	Central Java North Coast	113	JT_BR
114	Jawa Tengah	Cilacap	Central Java South Coast	114	JT_CI
115	Jawa Tengah	Cilacap	Citandury	114	JT_CI
116	Jawa Tengah	Demak	Central Java North Coast	115	JT_DE
117	Jawa Tengah	Demak	Java North East Coast	115	JT_DE
118	Jawa Tengah	Demak	Lusi	115	JT_DE
119	Jawa Tengah	Jepara	Java North East Coast	117	JT_JE
120	Jawa Tengah	Kebumen	Central Java South Coast	119	JT_KB
121	Jawa Tengah	Kendal	Central Java North Coast	120	JT_KN
122	Jawa Tengah	Kota Pekalongan	Central Java North Coast	123	JT_PM
123	Jawa Tengah	Kota Tegal	Central Java North Coast	125	JT_TM
124	Jawa Tengah	Pati	Java North East Coast	128	JT_PA
125	Jawa Tengah	Pekalongan	Central Java North Coast	129	JT_PR
126	Jawa Tengah	Pemalang	Central Java North Coast	130	JT_PL
127	Jawa Tengah	Purworejo	Central Java South Coast	133	JT_PW
128	Jawa Tengah	Rembang	Java North East Coast	134	JT_RE
129	Jawa Tengah	Tegal	Central Java North Coast	140	JT_TR
130	Jawa Tengah	Wonogiri	Solo	142	JT_WG

131	Jawa Timur	Banyuwangui	Java East Coast	145	JI_BW
132	Jawa Timur	Blitar	Brantas	148	JI_BR
133	Jawa Timur	Gresik	Solo	151	JI_GR
134	Jawa Timur	Jember	Java South East Coast	152	JI_JE
135	Jawa Timur	Lamongan	Solo	157	JI_LA
136	Jawa Timur	Lumajang	Java South East Coast	158	JI_LU
137	Jawa Timur	Malang	Brantas	162	JI_MG
138	Jawa Timur	Malang	Java South Coast	162	JI_MG
139	Jawa Timur	Pacitan	Java South Coast	168	JI_PC
140	Jawa Timur	Pamekasan	Solo	169	JI_PK
141	Jawa Timur	Pasuruan	Brantas	170	JI_PR
142	Jawa Timur	Pasuruan	Java East Coast	170	JI_PR
143	Jawa Timur	Probolinggo	Java East Coast	173	JI_PL
144	Jawa Timur	Sampang	Solo	175	JI_SA
145	Jawa Timur	Sidoarjo	Brantas	176	JI_SD
146	Jawa Timur	Situbondo	Java East Coast	177	JI_SB
147	Jawa Timur	Sumenep	Solo	178	JI_SM
148	Jawa Timur	Surabaya	Brantas	179	JI_SR
149	Jawa Timur	Surabaya	Solo	179	JI_BR
150	Jawa Timur	Trenggalek	Brantas	180	JI_TR
151	Jawa Timur	Tuban	Solo	181	JI_TB
152	Jawa Timur	Tulungagun	Brantas	182	JI_TG
153	Nusa Tenggara Barat	Bima	Sumbawa Island	268	NB_BI
154	Nusa Tenggara Barat	Dompu	Sumbawa Island	270	NB_DO
155	Nusa Tenggara Barat	Lombok Barat	Lombok Island	271	NB_LB
156	Nusa Tenggara Barat	Lombok Tengah	Lombok Island	272	NB_LT
157	Nusa Tenggara Barat	Lombok Timur	Lombok Island	273	NB_LI
158	Nusa Tenggara Barat	Mataram	Lombok Island	274	NB_LA
159	Nusa Tenggara Barat	Sumbawa Barat	Sumbawa Island	275	NB_SB
160	Nusa Tenggara Barat	Sumbawa	Sumbawa Island	276	NB_SU
161	Nusa Tenggara Timur	Alor		277	NT_AL
162	Nusa Tenggara Timur	Belu	Benain	278	NT_BE
163	Nusa Tenggara Timur	Ende	Flores Island	279	NT_EN
164	Nusa Tenggara Timur	Flores Timur		280	NT_FT
165	Nusa Tenggara Timur	Kupang	Mina Leke	281	NT_KR
166	Nusa Tenggara Timur	Kupang	Timor North West Coast	281	NT_KR
167	Nusa Tenggara Timur	Lembata		283	NT_LE
168	Nusa Tenggara Timur	Manggarai Barat	Flores Island	284	NT_MB
169	Nusa Tenggara Timur	Manggarai	Flores Island	285	NT_MA
170	Nusa Tenggara Timur	Ngada	Flores Island	286	NT_NG
171	Nusa Tenggara Timur	Rote Ndao		287	NT_RN
172	Nusa Tenggara Timur	Sikka	Flores Island	288	NT_SI
173	Nusa Tenggara Timur	Sumba Barat	Sumba Island	289	NT_SB
174	Nusa Tenggara Timur	Sumba Timur	Sumba Island	290	NT_ST
175	Nusa Tenggara Timur	Timor Tengah Selatan	Benain	291	NT_TS
176	Nusa Tenggara Timur	Timor Tengah Selatan	Mina Leke	291	NT_TS
177	Nusa Tenggara Timur	Timor Tengah Utara	Timor North West Coast	292	NT_TU
178	Yogyakarta	Bantul	Progo	440	YO_BA
179	Yogyakarta	Gunung Kidul	Progo	441	YO_GK
180	Yogyakarta	Kulon Progo	Progo	442	YO_GP

Sulawesi

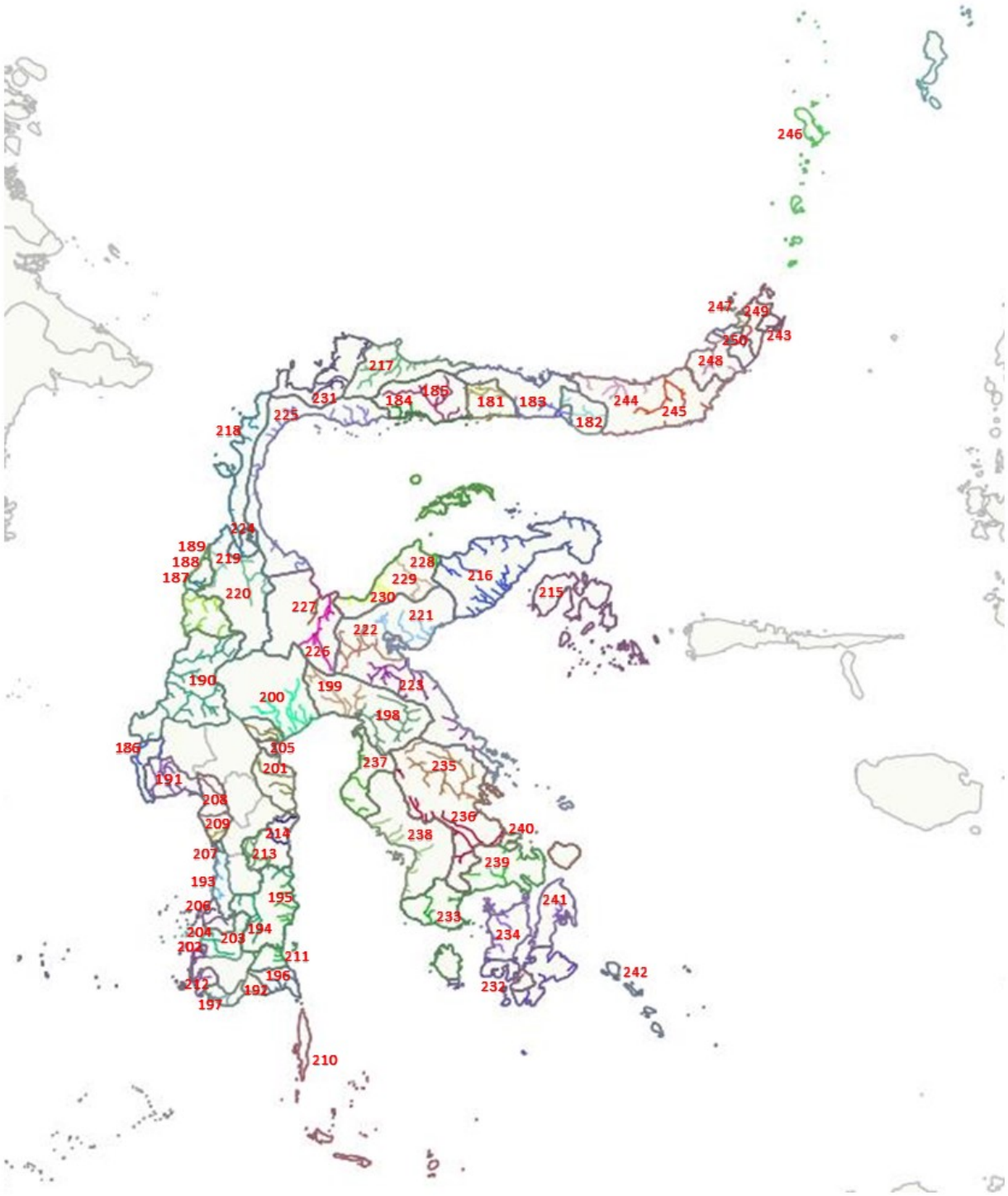

Figure 3: Map of proposed aquaculture management areas (AMAs) in Sulawesi, Indonesia, derived by overlaying administrative boundaries with watershed boundaries in GIS.

Table 3: Data fields used to assign the numerical ID codes for identified aquaculture management areas (AMAs) in Sulawesi, Indonesia.

ID_AMA	Province	Regency	River/Watercourse	COD ISO	
				Number	Acronimus
181	Gorontalo	Boalemo	Paguyaman	53	GO_BO
182	Gorontalo	Bone Bolango	Paguyaman	54	GO_BB
183	Gorontalo	Gorontalo	Paguyaman	55	GO_GM
184	Gorontalo	Pohuwato	North Peninsular Coast 1	57	GO_PO
185	Gorontalo	Pohuwato	Paguyaman	57	GO_PO
186	Sulawesi Barat	Majene	Karama	324	SR_MJ
187	Sulawesi Barat	Mamuju Utara	Karama	326	SR_MU
188	Sulawesi Barat	Mamuju Utara	Lariang Koro	326	SR_MU
189	Sulawesi Barat	Mamuju Utara	North West Coast	326	SR_MU
190	Sulawesi Barat	Mamuju	Karama	327	SR_MM
191	Sulawesi Barat	Polewali Mamasa	Karama	328	SR_PM
192	Sulawesi Selatan	Bantaeng		329	SE_BT
193	Sulawesi Selatan	Barru	Kelara Maros	330	SE_BR
194	Sulawesi Selatan	Bone	Awo	331	SE_BO
195	Sulawesi Selatan	Bone	Kelara Maros	331	SE_BO
196	Sulawesi Selatan	Bulukumba	Kelara Maros	332	SE_BU
197	Sulawesi Selatan	Jeneponto	Kelara Maros	335	SE_JE
198	Sulawesi Selatan	Luwu Timur	Danau Towuti	336	SE_LT
199	Sulawesi Selatan	Luwu Timur	Kalaena	336	SE_LT
200	Sulawesi Selatan	Luwu Utara	Kalaena	337	SE_LU
201	Sulawesi Selatan	Luwu	Kalaena	338	SE_LW
202	Sulawesi Selatan	Makassar	Kelara Maros	339	SE_UP
203	Sulawesi Selatan	Maros	Awo	340	SE_MR
204	Sulawesi Selatan	Maros	Kelara Maros	340	SE_MR
205	Sulawesi Selatan	Palopo	Kalaena	341	SE_PA
206	Sulawesi Selatan	Pangkajene Kepulauan	Kelara Maros	342	SE_PK
207	Sulawesi Selatan	Pare Pare	Kelara Maros	343	SE_PP
208	Sulawesi Selatan	Pinrang	Sadang	344	SE_PI
209	Sulawesi Selatan	Pinrang	Kelara Maros	344	SE_PI
210	Sulawesi Selatan	Selayar		345	SE_SE
211	Sulawesi Selatan	Sinjai	Kelara Maros	347	SE_SI
212	Sulawesi Selatan	Takalar	Kelara Maros	349	SE_TA
213	Sulawesi Selatan	Wajo	Awo	351	SE_WA
214	Sulawesi Selatan	Wajo	Kalaena	351	SE_WA
215	Sulawesi Tengah	Banggai Kepulauan		352	ST_BK

ID_AMA	Province	Regency	River/Watercourse	COD ISO	
				Number	Acronimus
216	Sulawesi Tengah	Banggai	North East Coast 1	353	ST_BA
217	Sulawesi Tengah	Buol	North Peninsular Coast 1	354	ST_BT
218	Sulawesi Tengah	Donggala	North Peninsular Coast 1	355	ST_DO
219	Sulawesi Tengah	Donggala	North West Coast	355	ST_DO
220	Sulawesi Tengah	Donggala	Palu	355	ST_DO
221	Sulawesi Tengah	Morowali	North East Coast 1	356	ST_MO
222	Sulawesi Tengah	Morowali	North East Coast 4	356	ST_MO
223	Sulawesi Tengah	Morowali	South East Coast	356	ST_MO
224	Sulawesi Tengah	Palu	Palu	357	ST_PA
225	Sulawesi Tengah	Parigi Mountong	North Peninsular Coast 1	358	ST_PM
226	Sulawesi Tengah	Poso	Poso	359	ST_PO
227	Sulawesi Tengah	Poso	Puna	359	ST_PO
228	Sulawesi Tengah	Tojo Una Una	North East Coast 1	360	ST_TU
229	Sulawesi Tengah	Tojo Una Una	North East Coast 2	360	ST_TU
230	Sulawesi Tengah	Tojo Una Una	North East Coast 3	360	ST_TU
231	Sulawesi Tengah	Toli Toli	North Peninsular Coast 1	361	ST_TT
232	Sulawesi Tenggara	Baubau	South East Coast 3	362	SG_BA
233	Sulawesi Tenggara	Bombana	South East Coast 4	363	SG_BO
234	Sulawesi Tenggara	Buton	South East Coast 3	364	SG_BU
235	Sulawesi Tenggara	Kendari	Solo Matarombea	365	SG_KR
236	Sulawesi Tenggara	Kendari	South East Coast 2	365	SG_KR
237	Sulawesi Tenggara	Kolaka Utara	South East Coast 4	366	SG_KU
238	Sulawesi Tenggara	Kolaka	South East Coast 4	367	SG_KO
239	Sulawesi Tenggara	Konawe Selatan	South East Coast 3	368	SG_KS
240	Sulawesi Tenggara	Kota Kendari	South East Coast 3	369	SG_KM
241	Sulawesi Tenggara	Muna	South East Coast 3	370	SG_MU
242	Sulawesi Tenggara	Wakatobi		371	SG_BA
243	Sulawesi Utara	Bitung	Riano i Apo	372	SW_BI
244	Sulawesi Utara	Bolaang Mongondow	North Peninsular Coast 2	373	SW_BM
245	Sulawesi Utara	Bolaang Mongondow	Riano i Apo	373	SW_BM
246	Sulawesi Utara	Kepulauan Sangihe Talaud		374	SW_KS
247	Sulawesi Utara	Manado	Riano i Apo	375	SW_MA
248	Sulawesi Utara	Minahasa Selatan	Riano i Apo	376	SW_MS
249	Sulawesi Utara	Minahasa Utara	Riano i Apo	377	SW_MU
250	Sulawesi Utara	Minahasa	Riano i Apo	378	SW_MI
251	Sulawesi Utara	Sangihe Talaud		379	SW_ST