

Title: Application of ArcGIS Technology in Planning of Irrigation Area

Ms. Ling Li

Objectives

Planning of irrigation area involves complicated spatial information, such as administrative division, landform and geomorphic, river & hydrographic net, cultivated land distribution, and regional water conservancy facilities, etc. The traditional work method is usually to carry out many site exploration, survey, data collection and statistics in combination with topographic map, which is very complicated.

In this study, it uses powerful ArcGIS spatial expression and data processing technology, especially the DEM-based analysis module to distribute, extract, analyze and process the collected basic spatial information of administrative division, contour line, national land data, regional water conservancy facilities and other basic spatial information. The results are collected into a database for visual expression to provide data preparation and support for irrigation planning.

Methods

As an important tool and technology for collecting, storing, calculating, analyzing and managing geospatial data, Geographic Information System (GIS) has developed at an amazing speed and has been widely used in land management, urban planning, water conservancy and hydropower engineering, geological prospecting and surveying, transportation and other fields. GIS technology could integrate graphics, text and data information of related elements, providing a more superior platform and application space for spatial data operation and processing, as well as a more efficient and high-quality software environment for planning work involving spatial data management.

It takes Jintangchong irrigation area as an example, using ArcGIS vector data processing technology, to distribute, extract, analyze and process the collected basic spatial information of administrative division, contour line, and the national land data, regional water conservancy facilities and other basic spatial information. Thus, the total area of irrigation area, cultivated land area and the quantity, scale and distribution of various irrigation facilities divided by different project schemes, different control elevation, different irrigation mode, and different administrative division are formed, and the results are collected into a database for visual expression, providing basis for designers to analyze the main problems existing in agricultural irrigation in the planning area. Meanwhile, the corresponding data within research scope can be processed for the second time in combination with other office software, so as to fulfill statistics of project Table and scheme comparison.

Presentation of Results

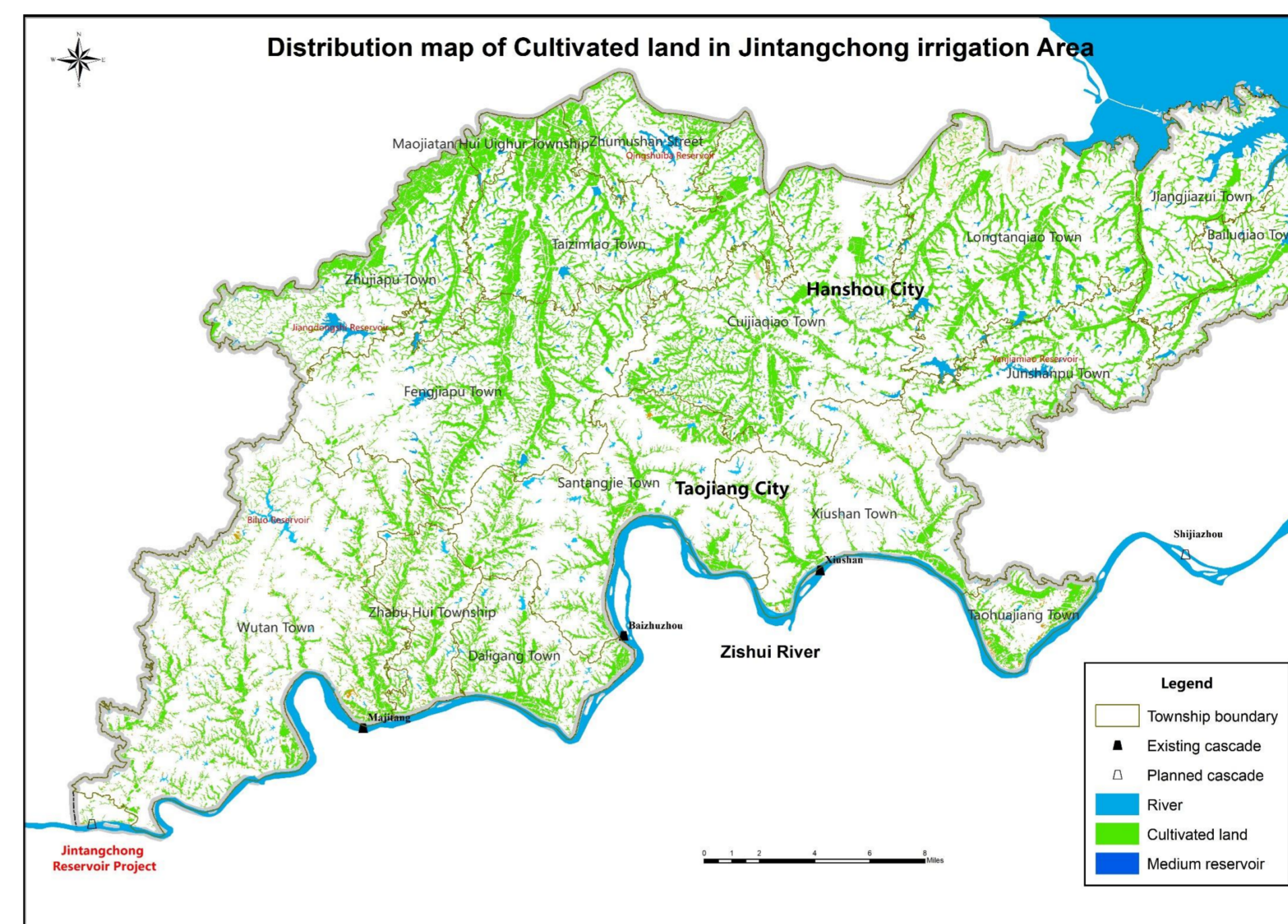


Figure 2 Distribution map of cultivated land in Jintangchong irrigation Area

Table1 Status of Township in Jintangchong Irrigation range (Taojiang County)

Town	Population (person)		Land area (km ²)	Cultivated land area (Mu)		
	Total	Rural population		Total	Paddy field	Dry Land
Santangle Town	53071	42198	119	35597	32834	1763
Xiashan Town	35784	28104	93	23076	20884	2192
Wutan Town	78912	63613	223	56988	48522	7548
Zhubu Town	21041	17916	38	16215	14187	2029
Taohuajiang Town	19631	17219	24	9670	9629	1041
Dalgang Town	19299	15589	47	16428	15015	1413
Total	225708	194728	544	157656	144070	13584

Table2 Status of Township in Jintangchong Irrigation range (Hanshou County)

Town	Population (person)		Land area (km ²)	Cultivated land area (Mu)		
	Total	Rural population		Total	Paddy field	Dry Land
Zhumushan Street	18628	12618	66.4	8466	7731	735
Jiangglazi Town	43683	24978	63.55	22185	10721	3444
Zhujiapu Town	24206	21182	81.31	34800	32384	2416
Taizimiao Town	47236	35870	115.45	57033	54162	2871
Cuijiqiao Town	56752	45524	151.1	63524	58896	4629
Junshanpu Town	27218	24807	70.86	22664	20638	2026
Bailuqiao Town	21739	17525	49.88	18316	13617	2699
Fengjiapu Town	50253	40502	145.91	55345	50114	5231
Longtanqiao Town	52721	42488	132.19	51741	47733	5008
Maqiatan Town	4836	4836	53.05	1395	1332	63
Total	347280	274688	931.7	332461	304229	28122

Table3 Distribution Map of Beneficial Land in Jintangchong Irrigation Area

City	Town	Land area (km ²)	Cultivated land area (Mu)		Beneficial area (Mu)	
			Total	Paddy field	Total	Paddy field
Taojiang	Santangle	119	35597	33834	21581	20910
	Xiashan	92.8	23076	20884	13742	12907
	Wutan	223	56988	48522	7548	32883
	Zhubu	37.7	16215	14187	2029	8767
	Taohuajiang	23.8	9670	8629	1041	5730
Hanshou	Dalgang	47.4	16428	15015	1413	9618
	Subtotal	544	157656	144070	15884	83274
	Zhumushan	66.4	8466	7731	735	8032
	Jiangglazi	63.6	22185	10721	3444	20949
	Zhujiapu	81.3	34800	32384	2416	33045
Total	Taizimiao	115	57033	54162	2871	54214
	Cuijiqiao	151	63524	58896	4629	60310
	Junshanpu	70.9	22664	20638	2026	21458
	Bailuqiao	49.9	18316	13617	2699	15413
	Fengjiapu	148	55345	50114	5231	52484
Subtotal	Longtanqiao	132	51741	46733	5008	49060
	Maqiatan	53.1	1395	1332	63	1327
	Total	1476	499506	446399	48196	409006

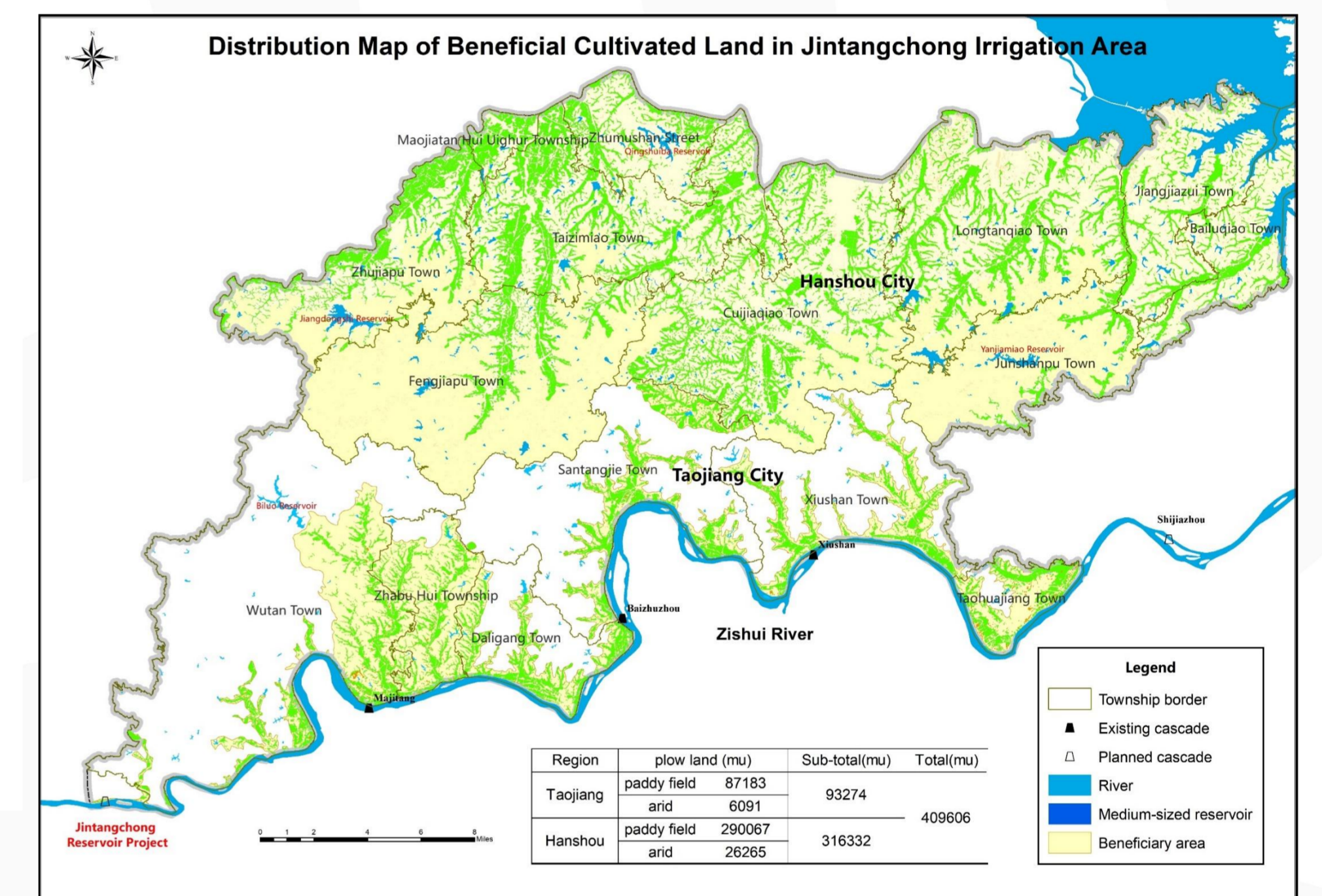


Figure 3 Distribution Map of Beneficial Cultivated Land in Jintangchong Irrigation Area

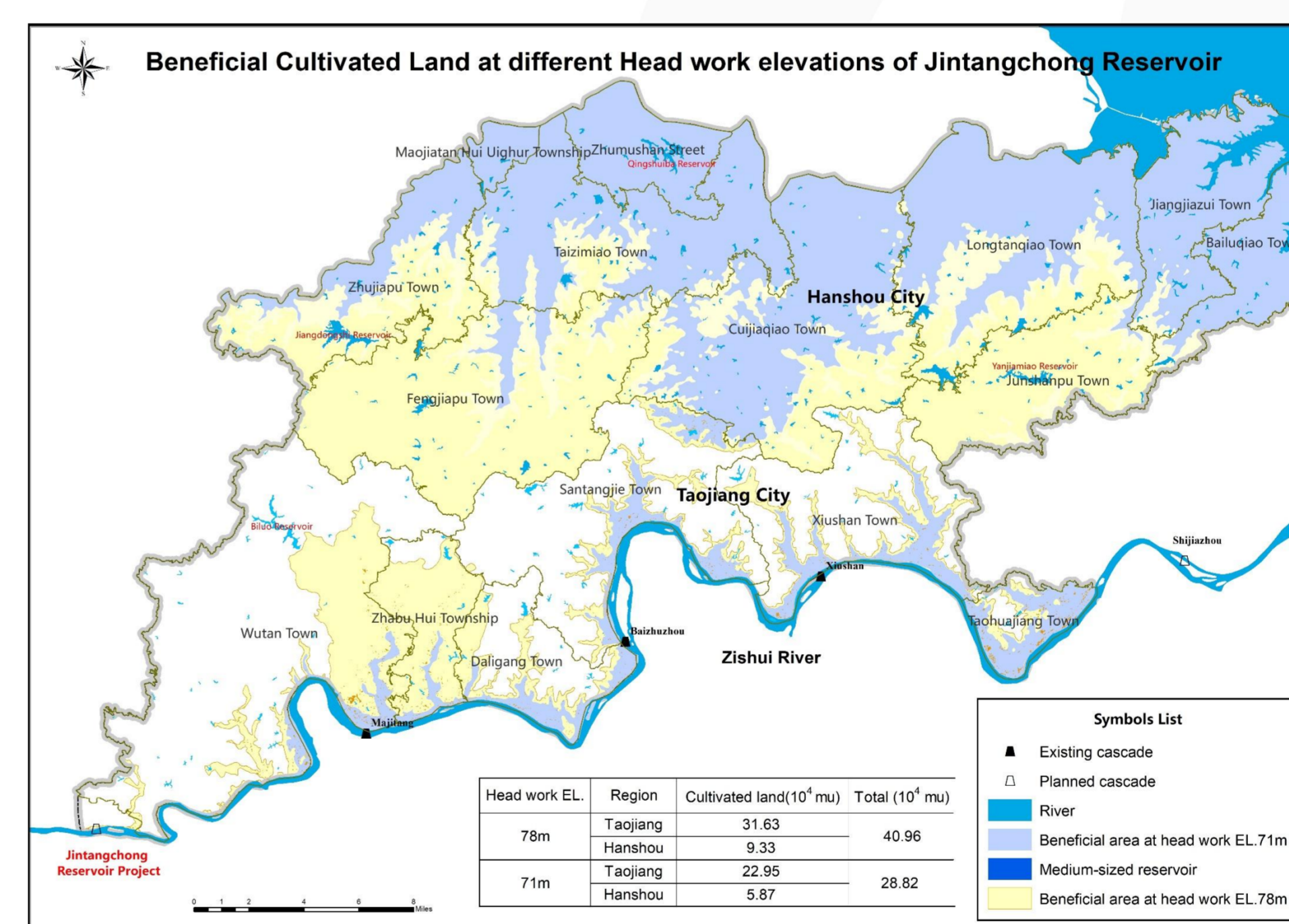


Figure 4 Beneficial Land at different Head work EL. of Jintangchong Reservoir

Table4 Beneficial Land at different head work EL. of Jintangchong Reservoir

City	Town	Beneficial area at EL.7.0m (Mu)			Beneficial area at EL.7.1m (Mu)		
		Total	Paddy field	Dry Land	Total	Paddy field	Dry Land
Taojiang	Santangle	21581	20910	672	16243	15751	492
	Xiashan	13742	12907	835	12673	12230	444
	Wutan	32883	29987	2876	13226	12453	767
	Zhubu	8767	8767	775	3605	3600	50
	Taohuajiang	5730	5333	397	5000	4615	385
Hanshou	Dalgang	9618	9279	339	8462	8191	271
	Subtotal	93274	87183	6091	50673	46604	2439
	Zhumushan	8032	7369	663	7364	6848	516
	Jiangglazi	20949	17844	3106	20008	17035	2973
	Zhujiapu	33045	30867	2179	27708	26588	1120
Total	Taizimiao	54214	51624	2590	51134	49453	1681
	Cuijiqiao	60310	56136	4175	49327	46604	2723
	Junshanpu	21498	19671	1827	3810	3658	152
	Bailuqiao	15413	12979	2434	12625	10768	1857
	Fengjiapu	52484	47766	4718	11090	10025	1065
Subtotal	Longtanqiao	49060	44543	4517	45167	41025	4143
	Maqiatan	1327	1270	57	1296	1290	35
	Total	316332	298087	28285	22959	214444	15385

Conclusions

With the rapid development of modern information technology, the widespread and application of GIS provides a more convenient, fast and accurate data processing platform and method for traditional design work. With the application of ArcGIS data processing technology in planning work, basic spatial information can be quickly collected according to requirements to form an information database for the research scope. It can also synchronously update the attributes of points, lines, planes and other elements representing different information within the research scope when generating maps and conduct secondary processing of information in combination with other office software. It can meet the multi-level needs of mapping, listing, and auxiliary program analysis, which is conducive to quickly grasp the overall situation of the project area in the planning stage, analyze existing problems, and formulate scheme of engineering measures.

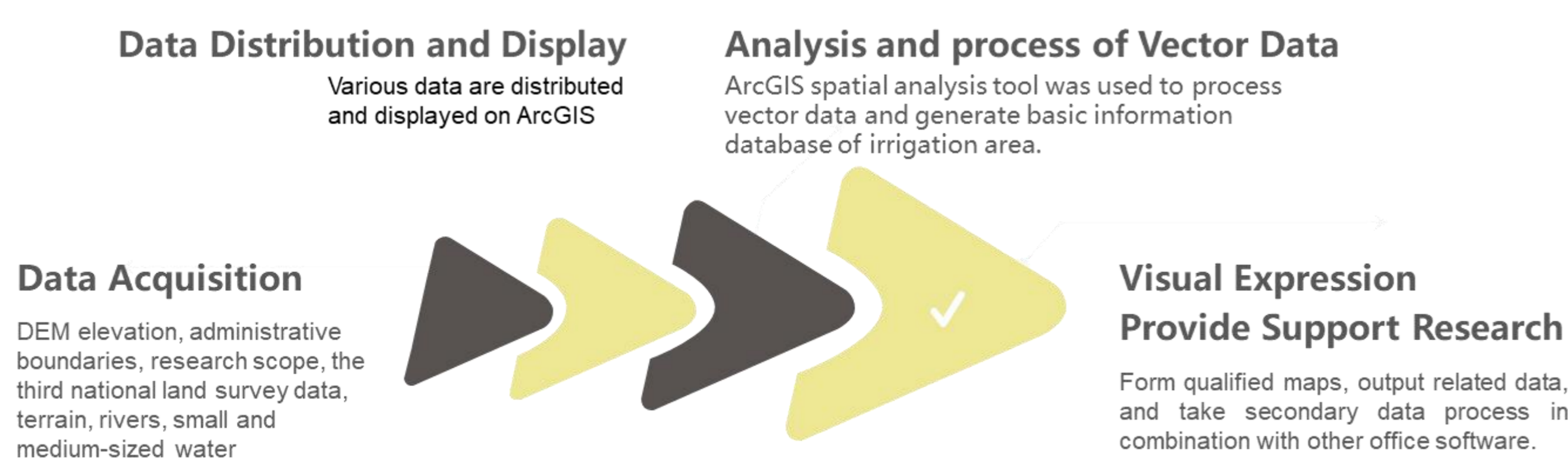


Figure 1 Logic flowchart of research ideas and steps