

**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
NATIONAL CENTRE FOR RURAL WATER SUPPLY AND
ENVIRONMENTAL SANITATION (N-CERWASS)**

**THE STUDY
ON GROUNDWATER DEVELOPMENT
IN THE RURAL PROVINCES
OF THE SOUTHERN COASTAL ZONE
IN THE SOCIALIST REPUBLIC
OF VIETNAM**

FINAL REPORT

(Data Book)

MARCH 2009

TOKYO ENGINEERING CONSULTANTS CO., LTD.

IN ASSOCIATION WITH

OYO INTERNATIONAL CORPORATION

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DATA Book

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DATA 1

METEOROLOGY AND HYDROLOGY

DATA-1 METEOROLOGY AND HYDROLOGY

1.1 Precipitation

(1) Annual precipitation

	<i>Phu Yen</i>		<i>Khanh Hoa</i>		<i>Ninh Thuan</i>		<i>Binh Thuan</i>		
	<i>Tuy Hoa</i>	<i>Son Hoa</i>	<i>Nha Trang</i>	<i>Cam Ranh</i>	<i>Phan Rang</i>	<i>Tan My</i>	<i>Phan Thiet</i>	<i>LaGi</i>	<i>Ta Pao</i>
1995	1897.6	1606.3	1157.0	918.5	752.0	1185.4	1050.7	1561.5	2180.2
1996	2529.2	2065.9	1892.3	1779.6	1079.4	1992.9	1416.1	1436.6	1971.7
1997	1768.5	1425.1	1004.3	914.1	575.6	1209.2	826.4	1868.4	2261.3
1998	2682.4	2160.3	2227.6	1947.7	1332.1	2010.3	1164.1	1388.7	2462.7
1999	2751.2	2451.0	1822.9	1639.8	1041.5	1525.5	1768.1	1529.9	2368.7
2000	2600.7	2467.0	2264.4	2376.0	1130.0	2100.1	1544.8	1501.6	2687.0
2001	1623.5	1712.9	1414.7	1331.6	856.3	970.6	1058.7	1608.1	2140.8
2002	2264.1	1715.6	1600.4	1188.0	586.3	1027.8	1115.8	1536.5	1965.3
2003	1857.1	1648.6	1445.9	1303.1	752.9	1145.4	1133.8	1724.2	2269.4
2004	1030.7	991.1	802.7	677.0	540.0	792.7	930.3	987.3	1704.0
2005	2295.1	1923.9	1800.7	1777.3	824.6	1324.5	1150.5	1260.3	2174.9
Average	2118.2	1833.4	1584.8	1441.2	861.0	1389.5	1196.3	1491.2	2198.7

(2) Monthly precipitations at each meteorological stations

Station: Nha Trang
Province: Khanh Hoa

PRECIPITATION PER MONTHS

Units: (mm)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
1995	11.7	2.4	13.8	37.2	60.8	12.1	109.9	45.9	91.0	338.1	208.9	225.2	1157.0
1996	48.8	7.1	5.0	49.8	159.4	109.6	8.0	70.4	284.3	280.7	387.5	481.7	1892.3
1997	9.3	14.9	0.0	23.9	34.0	10.2	57.5	89.1	302.5	207.4	174.2	81.3	1004.3
1998	45.7	7.8	15.0	4.9	89.8	13.4	30.5	32.5	325.0	502.3	820.3	340.4	2227.6
1999	75.9	18.4	7.8	86.4	17.7	44.2	36.1	44.8	80.0	440.7	538.4	432.5	1822.9
2000	136.7	11.5	13.5	79.6	166.5	73.0	58.6	13.3	96.5	576.4	758.7	280.1	2264.4
2001	116.9	0.0	186.4	73.5	96.6	12.5	3.3	62.3	355.5	287.4	156.0	64.3	1414.7
2002	1.0	14.4	0.0	18.3	53.1	7.8	13.7	37.8	339.6	203.6	723.8	187.3	1600.4
2003	6.6	7.5	5.0	0.4	238.6	23.1	51.5	24.7	92.7	532.9	317.8	145.1	1445.9
2004	18.9	0.0	0.3	8.3	163.9	117.2	58.3	49.2	115.6	141.4	81.7	47.9	802.7
2005	5.9	0.4	38.4	3.4	0.2	32.3	41.9	10.8	258.4	487.3	355.0	566.7	1800.7
Average	43.4	7.7	25.9	35.1	98.2	41.4	42.7	43.7	212.8	363.5	411.1	259.3	1584.8

Station: Cam Ranh
Province: Khanh Hoa

PRECIPITATION PER MONTHS

Units: (mm)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
1995	2.9	0.0	5.2	47.7	66.2	15.1	25.5	48.3	200.3	216.0	131.4	159.9	918.5
1996	26.4	18.0	15.9	25.1	138.4	120.6	15.2	34.9	124.0	451.6	367.7	441.8	1779.6
1997	1.2	10.0	0.0	22.1	43.1	62.2	39.7	60.2	153.9	128.5	255.0	138.2	914.1
1998	24.4	6.4	19.3	2.8	96.0	7.9	37.2	51.6	242.7	466.9	662.3	330.2	1947.7
1999	50.0	6.7	20.7	119.7	67.8	28.4	83.2	0.9	123.4	492.3	416.1	230.6	1639.8
2000	97.4	2.0	7.1	112.2	105.7	78.1	224.8	57.2	97.9	548.9	750.2	294.5	2376.0
2001	52.4	0.0	197.8	47.8	175.4	9.4	34.7	97.6	160.7	221.0	138.9	195.9	1331.6
2002	4.6	1.8	1.3	52.2	47.2	40.0	46.2	68.5	233.6	98.0	412.7	181.9	1188.0
2003	4.4	4.5	8.5	0.2	182.7	51.0	48.7	30.1	85.8	535.2	267.6	84.4	1303.1
2004	6.5	0.0	0.4	2.8	165.3	85.4	43.0	31.4	80.3	171.0	74.1	16.8	677.0
2005	0.7	2.9	7.7	0.0	27.3	207.4	67.9	43.1	270.5	372.3	252.3	525.2	1777.3
Average	24.6	4.8	25.8	39.3	101.4	64.1	60.6	47.6	161.2	336.5	338.9	236.3	1441.2

Station: Tuy Hoa
Province: Phu Yen

PRECIPITATION PER MONTHS

Units: (mm)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
1995	35.1	15.2	12.2	39.8	48.7	18.1	38.9	74.1	450.7	580.7	274.4	309.7	1897.6
1996	51.1	16.8	0.1	35.0	69.2	137.9	27.2	64.7	263.6	598.2	768.0	497.4	2529.2
1997	33.6	32.8	1.4	16.0	150.0	36.3	132.3	54.0	459.8	457.1	333.6	61.6	1768.5
1998	74.8	7.8	29.8	4.2	54.8	2.9	29.6	48.7	206.4	559.2	1273.2	391.0	2682.4
1999	107.3	42.5	4.9	96.7	71.3	16.7	1.1	6.8	125.7	803.7	556.2	918.3	2751.2
2000	158.9	45.8	28.6	59.3	233.1	78.4	46.1	83.9	37.7	747.2	758.4	323.3	2600.7
2001	43.4	25.8	237.4	61.2	56.3	30.2	2.7	95.3	143.8	470.5	388.4	68.5	1623.5
2002	7.8	21.9	11.8	20.2	250.9	4.0	26.8	62.9	243.8	210.4	1087.3	316.3	2264.1
2003	10.9	11.8	8.2	24.6	379.2	61.4	15.8	51.5	95.0	774.0	291.9	132.8	1857.1
2004	32.3	2.2	5.7	3.5	84.5	132.2	47.7	17.9	210.3	289.1	138.0	67.3	1030.7
2005	28.9	7.0	18.6	7.0	4.3	31.2	24.2	19.3	534.5	470.6	468.9	680.6	2295.1
Average	53.1	20.9	32.6	33.4	127.5	49.9	35.7	52.6	251.9	541.9	576.2	342.4	2118.2

Station: Son Hoa
Province: Phu Yen

PRECIPITATION PER MONTHS

Units: (mm)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
1995	12.4	3.1	4.2	16.0	167.7	97.7	116.5	136.2	318.1	413.7	229.3	91.4	1606.3
1996	16.7	11.8	2.7	28.1	165.3	177.6	43.4	85.0	166.0	432.9	646.4	290.0	2065.9
1997	8.7	33.4	20.1	84.1	271.0	35.6	133.3	92.4	272.2	196.6	232.5	45.2	1425.1
1998	21.7	1.4	24.6	20.0	124.0	86.7	30.3	84.1	248.0	484.8	739.9	294.8	2160.3
1999	57.4	13.9	5.4	140.8	104.4	150.7	44.1	113.8	145.0	596.9	463.3	615.3	2451
2000	54.8	39.7	5.4	150.8	292.1	60.5	60.9	209.2	78.5	576.6	747.3	191.2	2467
2001	26.6	7.8	272.0	10.9	123.8	64.6	14.3	251.5	211.7	374.0	205.2	150.5	1712.9
2002	11.7	12.2	0.8	19.8	169.5	43.5	49.6	185.5	215.1	269.1	575.0	163.8	1715.6
2003	4.1	4.2	4.1	0.4	396.4	58.7	65.5	160.7	127.5	438.2	332.3	56.5	1648.6
2004	15.2	0.3	0.3	28.2	154.5	158.9	139.6	21.1	158.8	183.5	95.8	34.9	991.1
2005	5.3	3.1	29.0	7.2	187.8	111.4	83.7	41.8	302.7	454.7	314.9	382.3	1923.9
Average	21.3	11.9	33.5	46.0	196.0	95.1	71.0	125.6	204.0	401.9	416.5	210.5	1833.4

Station: Phan Rang
Province: Ninh Thuan

PRECIPITATION PER MONTHS

Units: (mm)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
1995	0.9	0.0	1.5	1.7	17.2	84.9	68.4	92.0	256.2	136.5	66.0	26.7	752.0
1996	1.9	7.9	0.3	8.8	138.3	62.0	21.1	43.6	196.6	138.9	249.3	210.7	1079.4
1997	0.0	2.9	0.0	15.9	139.8	45.8	103.8	17.0	133.8	48.7	44.2	23.7	575.6
1998	0.0	0.0	4.5	0.6	41.7	122.6	26.9	44.2	256.7	291.2	328.5	215.2	1332.1
1999	5.9	0.0	16.5	67.3	67.6	8.9	22.7	45.1	156.1	294.1	240.1	117.2	1041.5
2000	6.0	1.7	0.0	32.7	45.4	77.1	85.6	32.4	46.6	346.8	291.2	164.5	1130.0
2001	5.3	0.0	61.8	62.9	101.3	73.6	19.7	85.2	100.6	95.1	94.8	156.0	856.3
2002	0.1	0.0	1.0	73.0	44.1	5.2	69.9	77.9	105.8	42.0	147.6	19.7	586.3
2003	0.0	0.0	3.2	0.0	97.9	23.0	19.0	8.1	121.1	217.6	252.5	10.5	752.9
2004	0.0	0.0	0.0	0.0	80.9	151.5	34.2	50.9	75.9	103.6	34.9	8.1	540.0
2005	0.0	0.0	3.8	0.0	16.8	25.2	22.3	38.7	165.1	202.1	109.3	241.3	824.6
Average	1.8	1.1	8.4	23.9	71.9	61.8	44.9	48.6	146.8	174.2	168.9	108.5	861.0

Station: Tan My
Province: Ninh Thuan

PRECIPITATION PER MONTHS

Units: (mm)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
1995	0.0	0.0	0.0	3.2	172.6	88.3	145.2	151.7	317.2	172.4	87.4	47.4	1185.4
1996	0.0	0.0	0.3	19.0	291.2	115.8	22.8	113.2	434.3	381.8	325.1	289.4	1992.9
1997	0.0	0.0	0.0	29.9	262.4	93.6	215.6	57.6	282.3	188.7	63.6	15.5	1209.2
1998	0.0	0.0	9.3	17.8	125.4	194.4	57.6	239.4	289.0	382.1	374.3	321.0	2010.3
1999	51.2	0.0	1.8	197.6	200.0	58.3	77.8	211.5	130.8	323.5	154.3	118.7	1525.5
2000	3.3	0.0	0.0	172.5	126.5	166.4	162.2	72.8	172.6	653.9	420.1	149.8	2100.1
2001	6.0	0.0	107.9	11.2	113.8	46.3	119.6	55.0	197.3	163.1	46.2	104.2	970.6
2002	0.0	0.0	0.0	10.0	87.2	62.3	67.1	142.9	122.7	201.1	262.5	72.0	1027.8
2003	0.0	0.0	4.8	0.0	125.9	46.7	72.4	10.4	296.9	255.9	304.0	28.4	1145.4
2004	8.6	0.0	0.0	25.4	124.9	139.4	143.0	202.4	68.6	64.2	5.8	10.4	792.7
2005	0.0	0.0	7.9	0.0	97.7	66.4	55.0	116.0	202.0	275.1	160.1	344.3	1324.5
Average	6.3	0.0	12.0	44.2	157.1	98.0	103.5	124.8	228.5	278.3	200.3	136.5	1389.5

Station: Phan Thiet
Province: Binh Thuan

PRECIPITATION PER MONTHS

Units: (mm)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
1995	0.1	0.0	0.5	5.3	77.2	85.8	250.1	246.7	254.7	97.4	22.1	10.8	1050.7
1996	0.2	0.0	0.0	14.2	288.7	112.1	198.4	80.2	282.3	130.3	300.1	9.6	1416.1
1997	0.0	0.0	0.0	35.3	81.5	89.9	137.9	212.4	135.7	43.5	90.2	0.0	826.4
1998	0.0	1.4	0.0	16.5	179.8	51.7	64.9	87.0	340.9	89.3	175.1	157.5	1164.1
1999	3.3	0.0	2.3	169.0	206.3	278.0	348.2	254.7	143.5	250.5	90.5	21.8	1768.1
2000	1.4	2.1	0.2	67.6	186.8	195.9	169.1	184.3	148.9	249.4	227.6	111.5	1544.8
2001	0.0	0.0	12.6	15.5	163.3	100.9	173.3	255.8	182.4	146.0	6.2	2.7	1058.7
2002	0.0	0.0	0.0	65.0	92.0	145.3	118.8	299.3	254.8	124.9	15.2	0.5	1115.8
2003	0.0	0.0	0.0	14.8	248.6	102.3	281.4	96.5	167.5	106.1	107.8	8.8	1133.8
2004	0.0	0.0	0.0	9.3	375.8	163.7	94.6	186.4	31.8	66.4	1.2	1.1	930.3
2005	0.0	0.0	0.0	0.5	180.7	102.8	204.6	205.9	185.3	225.9	5.1	39.7	1150.5
Average	0.5	0.3	1.4	37.5	189.2	129.9	185.6	191.7	193.4	139.1	94.6	33.1	1196.3

Station: LaGi
Province: Binh Thuan

PRECIPITATION PER MONTHS

Units: (mm)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
1995	0.5	0.0	2.9	4.6	131.8	123.4	519.4	304.3	377.6	82.6	9.1	5.3	1561.5
1996	0.1	0.0	0.0	7.6	287.9	160.1	166.8	169.3	244.1	177.1	209.7	13.9	1436.6
1997	0.0	0.0	0.0	9.4	182.3	432.3	331.7	417.1	365.9	66.4	63.3	-	1868.4
1998	0.0	0.2	0.0	0.2	98.8	101.0	166.1	201.1	250.7	272.9	98.8	198.9	1388.7
1999	0.3	0.5	0.0	94.2	165.9	98.2	459.6	249.9	191.2	186.2	45.5	38.4	1529.9
2000	5.5	2.6	6.4	66.7	186.1	232.3	338.2	251.4	96.7	93.0	160.0	62.7	1501.6
2001	0.2	0.0	88.1	15.5	233.9	234.5	341.2	371.6	142.3	172.9	5.7	2.2	1608.1
2002	0.0	0.0	0.2	5.8	211.8	354.1	276.4	240.8	249.4	172.1	25.9	-	1536.5
2003	0.0	0.0	0.0	1.3	376.6	311.8	306.2	203.5	327.3	139.0	46.3	12.2	1724.2
2004	0.0	0.0	0.0	13.4	57.9	250.6	109.0	320.5	173.7	61.7	0.4	0.1	987.3
2005	0.0	0.0	0.0	31.4	129.4	210.7	205.3	236.9	280.8	144.5	0.9	20.4	1260.3
Average	0.6	0.3	8.9	22.7	187.5	228.1	292.7	269.7	245.4	142.6	60.5	39.3	1491.2

Station: Ta Pao
Province: Binh Thuan

PRECIPITATION PER MONTHS

Units: (mm)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
1995	0.3	0.0	23.7	0.0	238.4	230.7	459.2	420.3	446.2	263.9	78.0	19.5	2180.2
1996	0.0	0.0	0.0	96.0	355.8	170.0	194.6	265.6	495.2	166.9	219.9	7.7	1971.7
1997	0.0	53.0	0.0	110.8	180.8	422.6	665.1	353.9	266.9	121.9	86.1	0.2	2261.3
1998	0.0	0.0	0.0	26.1	217.2	348.2	149.3	218.8	490.7	373.8	405.0	233.6	2462.7
1999	2.3	1.4	12.6	48.3	318.1	541.1	625.2	314.2	195.3	167.6	128.4	14.2	2368.7
2000	52.4	0.0	62.5	102.2	365.3	236.4	426.0	430.6	278.9	386.7	205.9	140.1	2687.0
2001	2.3	0.0	47.5	22.0	286.7	453.1	53.5	705.4	346.6	218.4	3.3	2.0	2140.8
2002	0.0	0.0	0.0	13.7	320.3	297.6	176.2	439.9	305.8	303.7	95.5	12.6	1965.3
2003	0.4	0.8	0.0	24.4	435.0	220.8	504.2	245.6	460.0	286.6	90.3	1.3	2269.4
2004	0.2	0.6	0.8	5.8	277.1	366.8	290.3	466.5	185.4	99.6	10.5	0.4	1704.0
2005	0.0	0.0	2.9	9.1	454.6	382.1	372.5	301.5	375.8	203.1	29.3	44.0	2174.9
Average	5.3	5.1	13.6	41.7	313.6	333.6	356.0	378.4	349.7	235.7	122.9	43.2	2198.7

(2) Monthly average of air temperature

Average of Air Temperature (1996~2005)

Month Station	1	2	3	4	5	6	7	8	9	10	11	12
Tuy Hoa	23.7	24.3	25.7	27.7	29.0	29.5	29.3	28.8	27.9	26.5	25.3	23.9
Son Hoa	22.5	23.4	25.6	27.8	28.6	28.7	28.6	28.1	27.2	25.6	24.6	23.0
Nha Trang	24.1	24.6	26.0	27.7	28.6	28.9	28.8	28.8	28.0	26.9	26.0	25.2
Cam Ranh	24.5	25.1	26.4	28.1	28.9	29.0	29.0	28.9	28.0	26.9	26.1	25.1
Phan Rang	24.8	25.4	26.7	28.1	28.8	28.8	28.7	28.5	27.8	26.9	26.2	25.2
Phan Thiet	25.2	25.7	27.0	28.5	28.5	27.9	27.3	27.2	27.3	27.3	26.8	25.9
La Gi	24.8	25.5	26.7	28.2	28.1	27.3	26.8	26.8	26.7	26.7	26.3	25.5

(3) Monthly average of pan evaporation

Average of Evaporation (1996~2005)

Month Station	1	2	3	4	5	6	7	8	9	10	11	12
Tuy Hoa	95.8	88.4	102.9	111.0	147.2	177.2	191.6	170.8	126.6	79.1	79.4	82.9
Son Hoa	79.2	96.7	145.1	156.2	151.9	159.2	191.0	175.0	110.4	66.4	53.4	56.3
Nha Trang	133.7	129.5	129.9	120.9	118.8	133.4	131.1	129.9	107.2	107.9	103.9	131.4
Cam Ranh	139.3	134.2	138.4	125.9	124.6	133.9	149.0	145.8	107.4	92.2	105.7	133.5
Phan Rang	193.2	185.2	179.4	154.8	146.8	155.9	169.4	165.8	124.3	107.4	124.1	158.4
Phan Thiet	121.1	118.1	129.7	117.8	110.4	101.7	98.7	97.8	86.2	80.8	89.2	108.0
La Gi	135.3	130.3	145.9	133.2	116.6	99.4	92.7	95.7	94.3	87.8	99.6	114.6

(4) Monthly average

The Monthly Average River Discharge (1995~2006)

(Units: m³/s)

Month River	1	2	3	4	5	6	7	8	9	10	11	12
Ba	163.6	94.2	58.7	57.0	106.2	124.8	126.2	220.5	407.7	589.4	784.0	642.7
Cai	78.8	42.5	35.6	30.0	43.3	45.5	39.5	35.0	57.1	120.8	209.0	241.3
Luy	3.9	1.8	1.1	2.6	11.5	14.4	17.2	18.2	37.7	64.6	26.9	20.8
La Nga	34.8	27.4	27.5	40.8	51.9	71.8	112.8	166.7	154.3	161.4	102.3	56.0

DATA 2
FIELD GEOLOGICAL SURVEY
AND
GROUND TRUTH FOR REMOTE SENSING ANALYSIS

Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/28	Location (UTM)		Elev	Geological Unit			
Point No.	PY-01	X (m)	Y (m)	(m)	VSW Index	V	S	W
		310,530	1,467,544	64				

Description

Topography of Quarternary volcanic rock

Topography: Tableland like terrace.

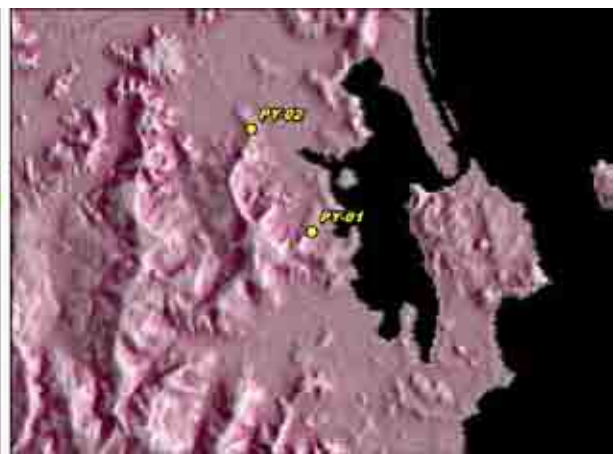
Soil: Dark brown colored soil from basalt?

Lnad use: Farmland (sugarcane, vegetable, paddy field in low land).

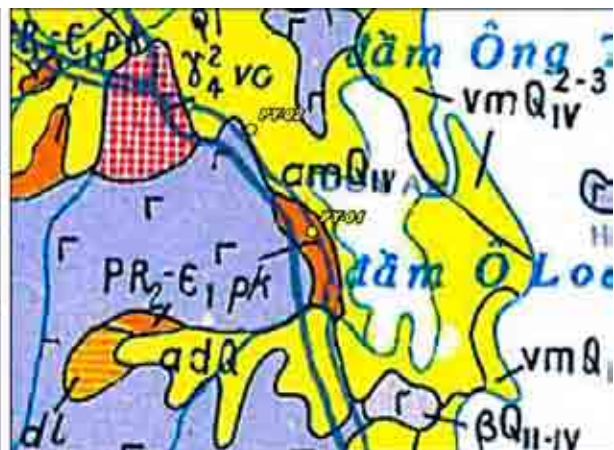
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/28	Location (UTM)		Elev	Geological Unit			
Point No.	PY-02	X (m)	Y (m)	(m)	VSW Index	V	S	W
		308,710	1,470,650	37				

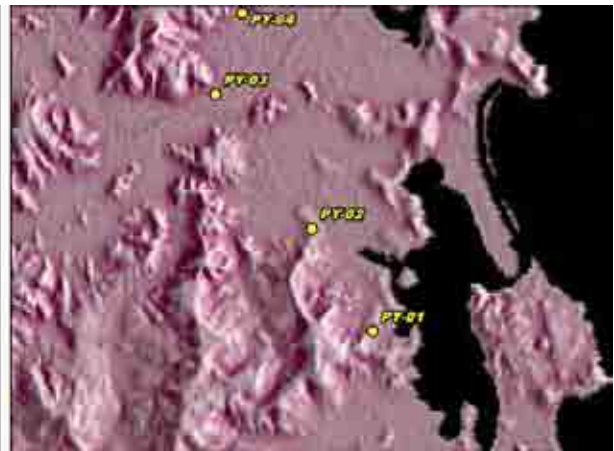
Description

Land use in flat land and high Water Index area
 Land use: Farmland (paddy field).

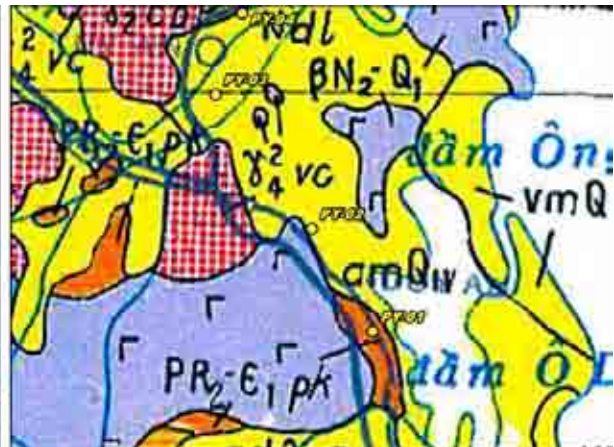
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/28	Location (UTM)		Elev	Geological Unit			
Point No.	PY-03	X (m)	Y (m)	(m)	VSW Index	V	S	W
		305,828	1,474,711	17				

Description

Land use in flat land near Triassic granite

Land use: Farmland (paddy field).

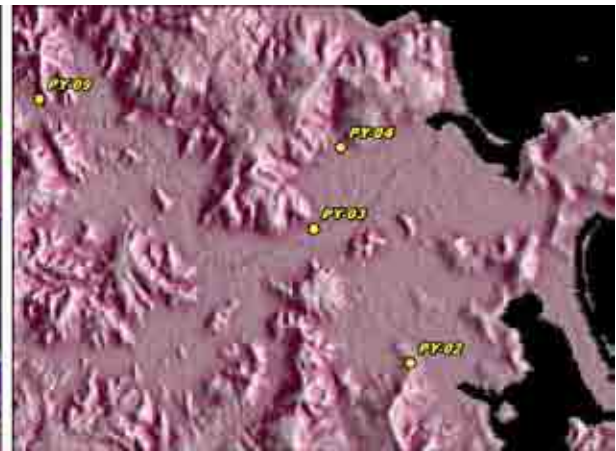
Topography: Low mountain in Triassic granite area with boulders.

Water use: Dug well, salinity water, granite in shallow part.

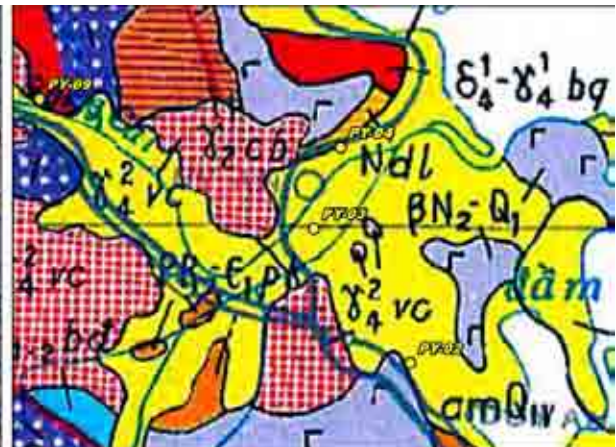
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/28	Location (UTM)		Elev	Geological Unit			
Point No.	PY-04	X (m)	Y (m)	(m)	VSW Index	V	S	W
		306,630	1,477,171	10				

Description

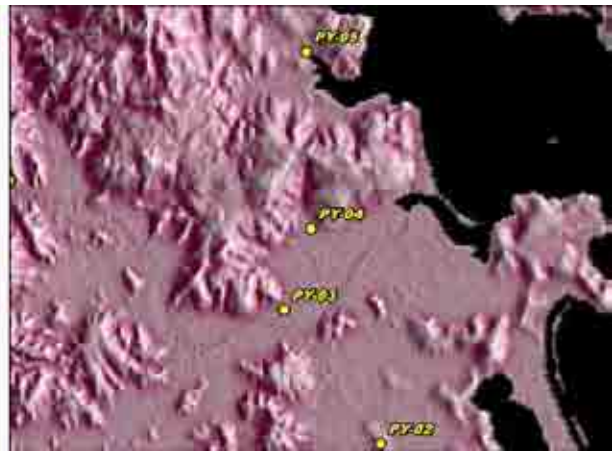
Test well site

Drilled by P-CERWASS at March of 2007.
 Depth: 30m (Alluvium / Basalt / Granite).
 Ground water: Aquifer in granite (0.5 litter / sec) , no salinity.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/28	Location (UTM)		Elev	Geological Unit			
Point No.	PY-05	X (m)	Y (m)	(m)	VSW Index	V	S	W
		306,488	1,482,527	7				

Description

Land use in Quaternary volcanic rock

Land use: Farmland (coconut), fish breeding pond and forestation.

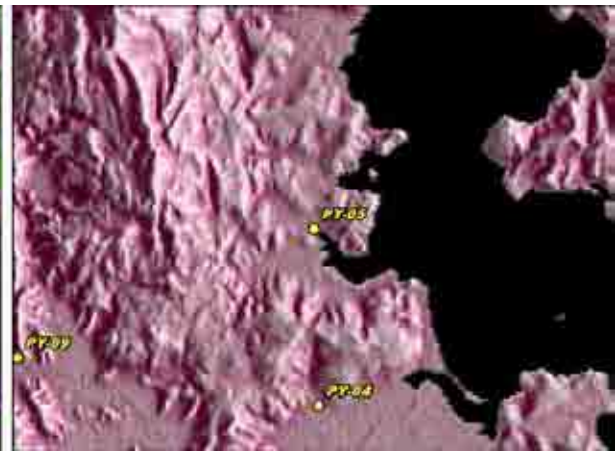
Water use: Dug well (D = 2m for agriculture, D = 8m for daily life), no water in dry season.

Water supply system: Supply station with drilled well (D = 30m, Aquifer in granite).

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/28	Location (UTM)		Elev	Geological Unit			
Point No.	PY-06	X (m)	Y (m)	(m)	VSW Index	V	S	W
		307,653	1,492,527	4				

Description

Test drilled well

Drilled by P-CERWASS at May of 2007 for observation.
Depth: 30m.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/28	Location (UTM)		Elev	Geological Unit			
Point No.	PY-07	X (m)	Y (m)	(m)	VSW Index	V	S	W
		310,003	1,500,855	0				

Description

Outcrop of Triassic volcanic rock

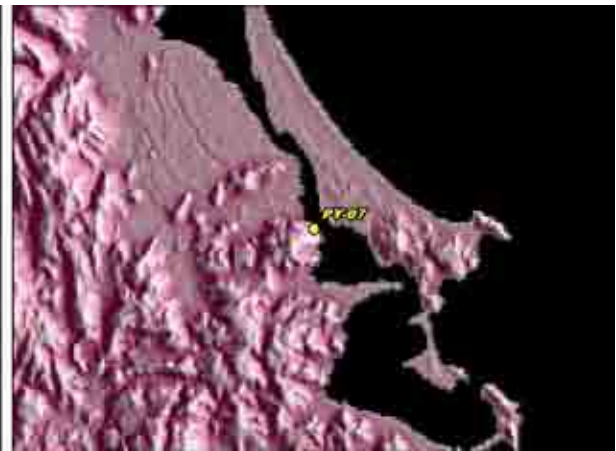
Lithology: Andesite with quartz vein, hard and compact by strongly silicification.

Land use: Quarry.

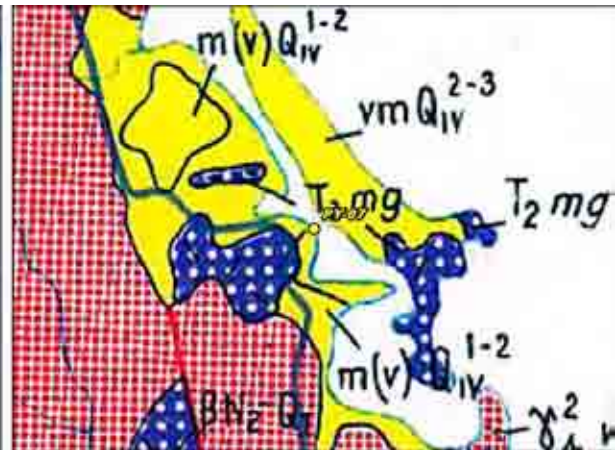
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/28	Location (UTM)		Elev	Geological Unit			
Point No.	PY-08	X (m)	Y (m)	(m)	VSW Index	V	S	W
		303,372	1,511,588	87				

Description

Boulder of Triassic granite

Lithology: Medium grained hornblende granite with chlorite?

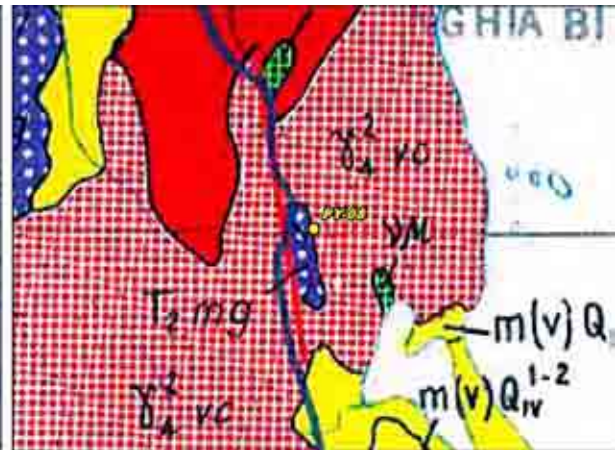
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/28	Location (UTM)		Elev	Geological Unit			
Point No.	PY-09	X (m)	Y (m)	(m)	VSW Index	V	S	W
		297,618	1,478,633	16				

Description

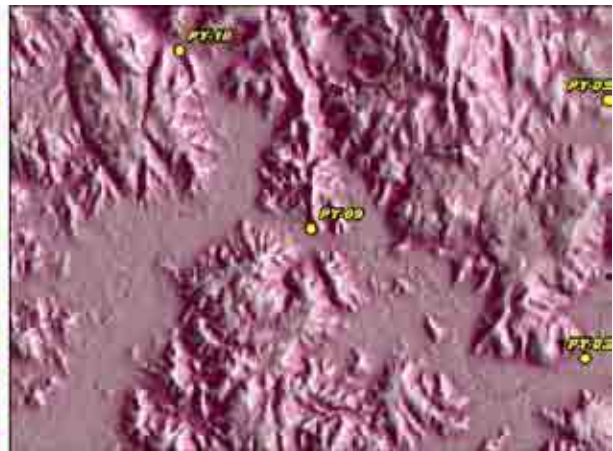
Outcrop of Triassic volcanic rock?

Lithology: Light gray colored silicified rock with quartz veins (Ave. 5mm, Max. 30mm), strongly silicification.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/28	Location (UTM)		Elev	Geological Unit			
Point No.	PY-10	X (m)	Y (m)	(m)	VSW Index	V	S	W
		293,690	1,484,031	26				

Description

Land use in Triassic volcanic rock

Land use: Farmland (mainly sugarcane).

Water use: Dug well (D = 10m, aquifer in granite?) and water supply system.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/28	Location (UTM)		Elev	Geological Unit			
Point No.	PY-11	X (m)	Y (m)	(m)	VSW Index	V	S	W
		291,128	1,486,182	30				

Description

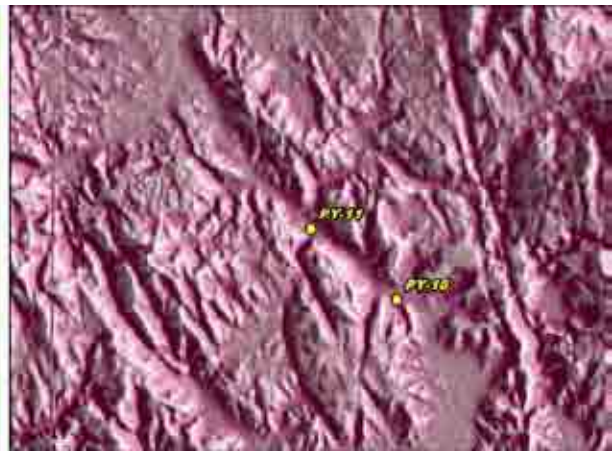
River along lineament

Topography: Mountain of granite and valley extend NW-SE, ridge of mountain is clear and gentle.
 Land use: Farmland (sugarcane in the river terrace and corn field on slope).
 Surface water: River, volume of water is rich.

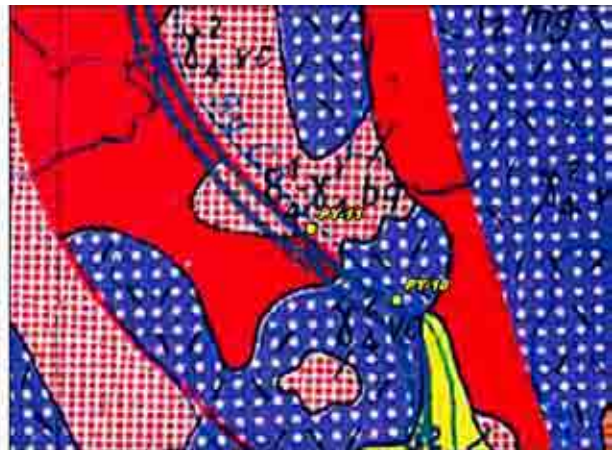
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/28	Location (UTM)		Elev	Geological Unit			
Point No.	PY-12	X (m)	Y (m)	(m)	VSW Index	V	S	W
		292,504	1,498,440	136				

Description

Land use in Triassic granite area

Land use: Sugarcane in gentle slope.

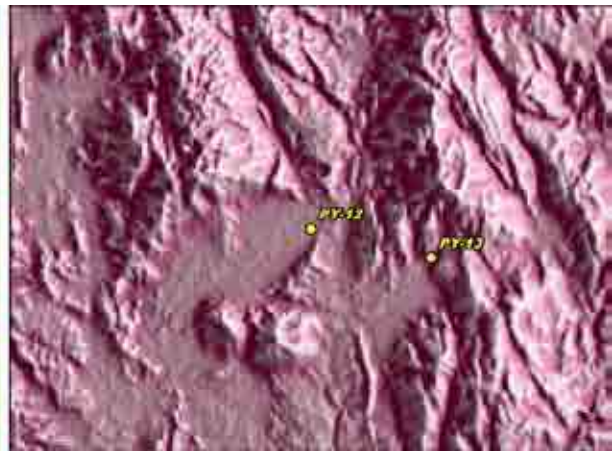
Topography: Gentle hill in Triassic volcanics and low mountain in Triassic granite area.

Water use: Dug well (D = 10m), no water in dry season.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/28	Location (UTM)		Elev	Geological Unit			
Point No.	PY-13	X (m)	Y (m)	(m)	VSW Index	V	S	W
		296,103	1,497,567	167				

Description

Outcrop of Triassic volcanics and granite

Lithology: Light gray colored silicified rock (rhyolite or rhyolitic tuff?) with quartz vein, weathered coarse grained granite.

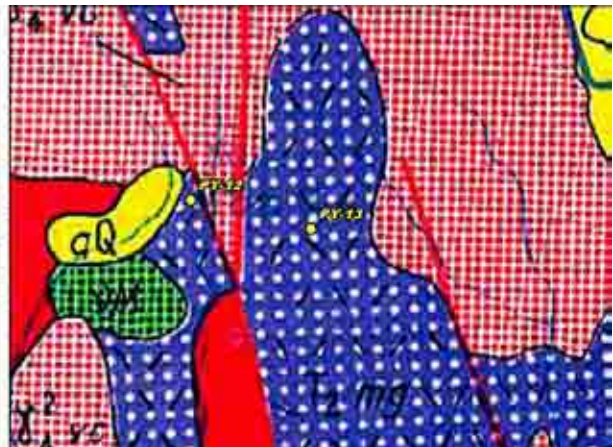
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/29	Location (UTM)		Elev	Geological Unit			
Point No.	PY-14	X (m)	Y (m)	(m)	VSW Index	V	S	W
		308,414	1,459,571	271				

Description

Outcrop of Quarternary volcanic rock

Lithology: Dark gray colored basalt, pillow structure (Max. 1m) with clay alteration and oxidization.

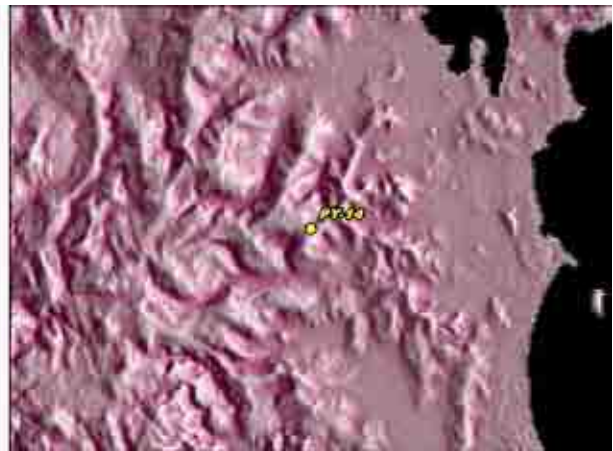
Land use: Farmland (banana, sugarcane and wheat).

Topography: Tableland like terrace.

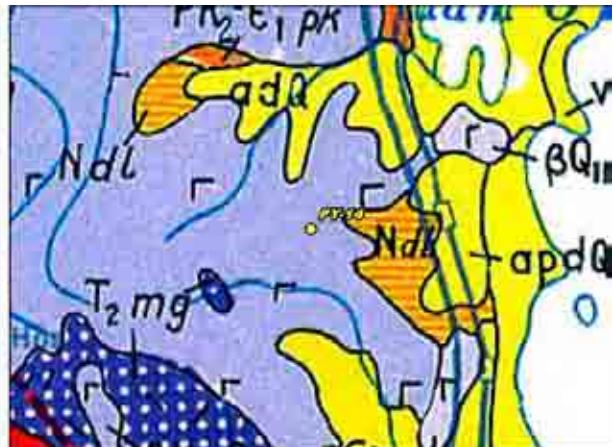
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/29	Location (UTM)		Elev	Geological Unit			
Point No.	PY-15	X (m)	Y (m)	(m)	VSW Index	V	S	W
		296,574	1,458,453	447				

Description

Land use of Quaternary volcanic rock

Land use: Farmland (sugarcane).

Soil: Reddish brown colored soil with basalt boulder.

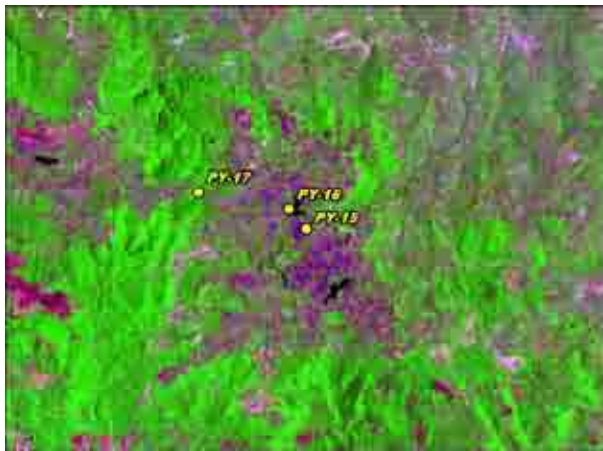
Topography: Flatland with gentle relief.

Water use: Dug well (D = 10 to 12m), water supply system with drilled well (D = 30m).

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/29	Location (UTM)		Elev	Geological Unit			
Point No.	PY-16	X (m)	Y (m)	(m)	VSW Index	V	S	W
		296,053	1,459,044	444				

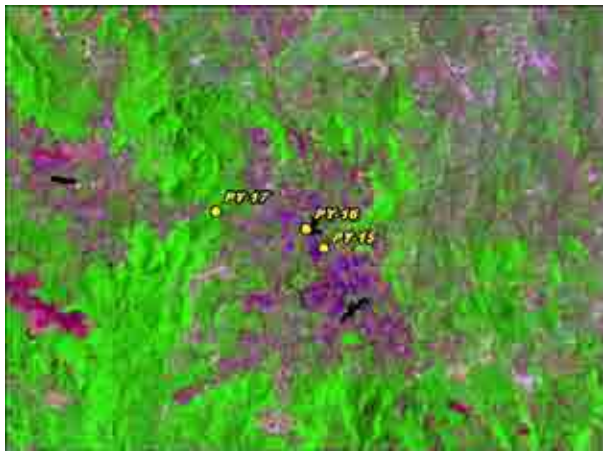
Description

Reservoir in Quarternary volcanic rock
 Water use: Reservoir for agricultural use.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/29	Location (UTM)		Elev	Geological Unit			
Point No.	PY-17	X (m)	Y (m)	(m)	VSW Index	V	S	W
		293,349	1,459,553	409				

Description

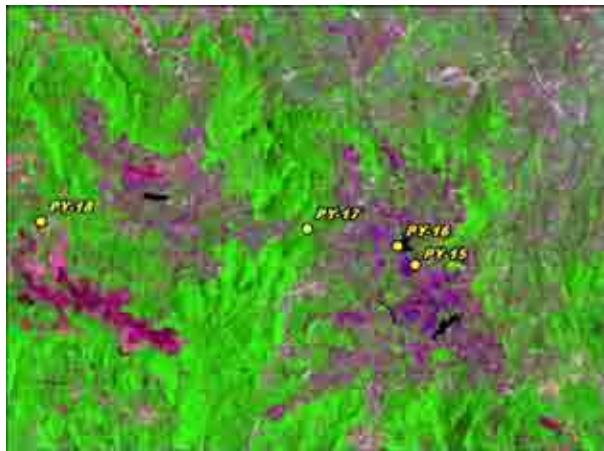
Outcrop of Triassic or Jurassic sedimentary rock?

Lithology: Light brown colored medium grained sandstone and siltstone (shale), N50E vertical, silicification (silicified rhyolite?) in whitish colored part.

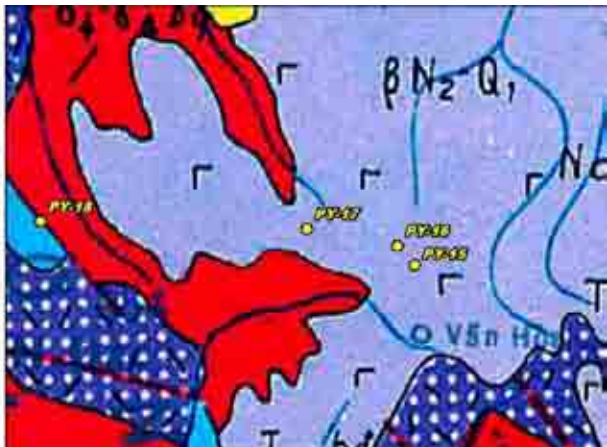
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/29	Location (UTM)		Elev	Geological Unit			
Point No.	PY-18	X (m)	Y (m)	(m)	VSW Index	V	S	W
		285,383	1,459,766	362				

Description

Outcrop of Jurassic sedimentary rock

Lithology: reddish gray colored siltstone (shale) and brown colored fine sandstone. E-W.

Land use: Farmland (sugarcane plantation).

Water use: Reservoir in low land.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/29	Location (UTM)		Elev	Geological Unit			
Point No.	PY-19	X (m)	Y (m)	(m)	VSW Index	V	S	W
		284,073	1,459,383	365				

Description

Drilled well (CT-319)

Photo

(No Picture)

Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/29	Location (UTM)		Elev	Geological Unit			
Point No.	PY-20	X (m)	Y (m)	(m)	VSW Index	V	S	W
		264,844	1,451,626	143				

Description

Land use in Triassic granite area

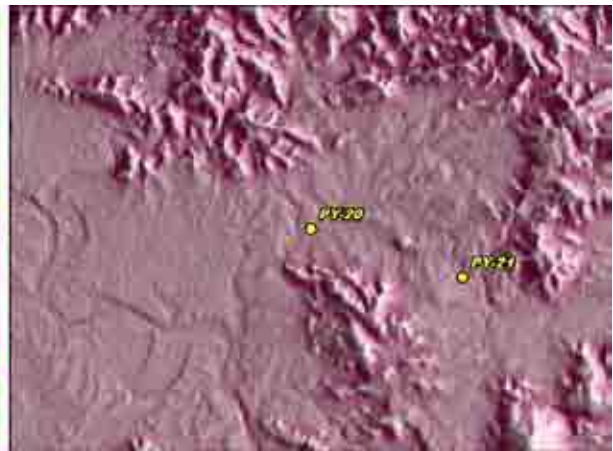
Land use: Farmland (fruit).

Topography: Gentle relief extend N-S (granite?).

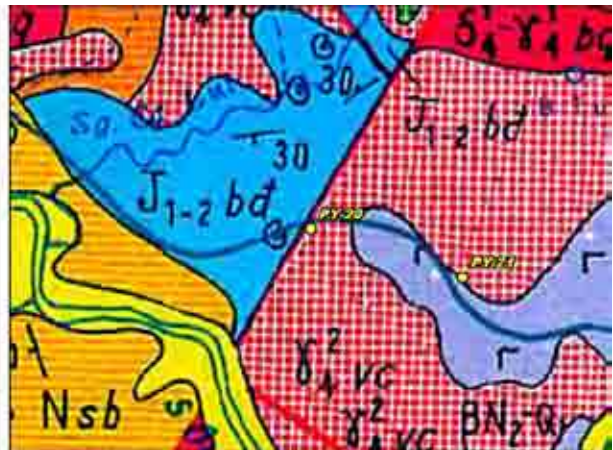
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/29	Location (UTM)		Elev	Geological Unit			
Point No.	PY-21	X (m)	Y (m)	(m)	VSW Index	V	S	W
		269,372	1,450,149	179				

Description

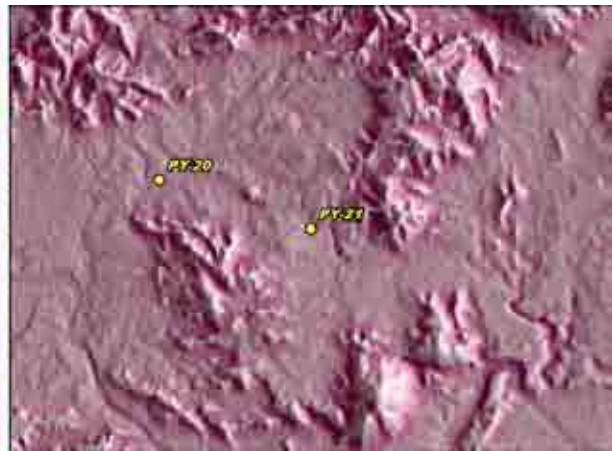
Outcrop of Triassic granite

Lithology: Coarse grained granite, weathered.
 Topography: gentle relief hill.
 Land use: Old quarry? many pond filled with rain water.

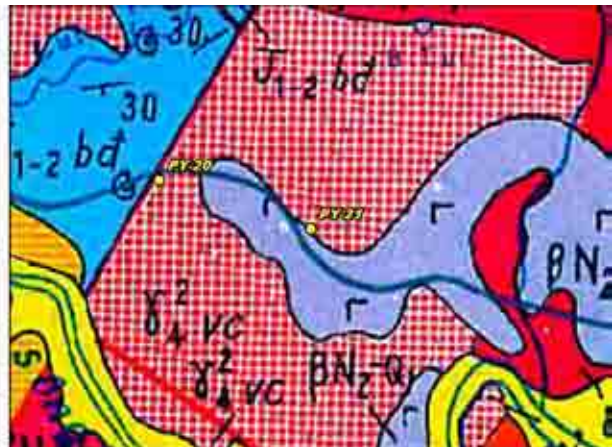
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/29	Location (UTM)		Elev	Geological Unit			
Point No.	PY-22	X (m)	Y (m)	(m)	VSW Index	V	S	W
		290,492	1,444,100	83				

Description

Topography of Jurassic sediments and Quaternary volcanics

Topography: Gentle hill in Jurassic sediments and tableland in Quaternary volcanics.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/29	Location (UTM)		Elev	Geological Unit			
Point No.	PY-23	X (m)	Y (m)	(m)	VSW Index	V	S	W
		302,523	1,439,614	14				

Description

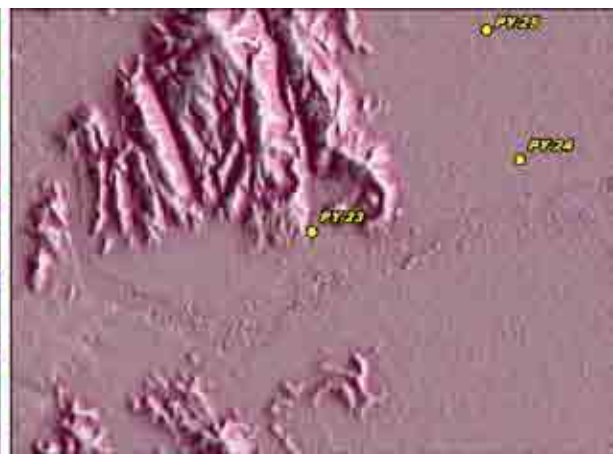
Agricultural water supply along river

Water use: Agricultural water supply from river water, irrigation canal (W = 5m), volume of water is rich.
 Land use: Farmland (almost paddy field) and forestation for paper in low mountain.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/29	Location (UTM)		Elev	Geological Unit			
Point No.	PY-24	X (m)	Y (m)	(m)	VSW Index	V	S	W
		308,740	1,441,787	9				

Description

Land use in alluvium plain

Land use: Farmland (almost paddy field).
 Water use: Irrigation canal from river water.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/29	Location (UTM)		Elev	Geological Unit			
Point No.	PY-25	X (m)	Y (m)	(m)	VSW Index	V	S	W
		307,740	1,445,719	-1				

Description

Small mountain of Triassic volcanic rock?

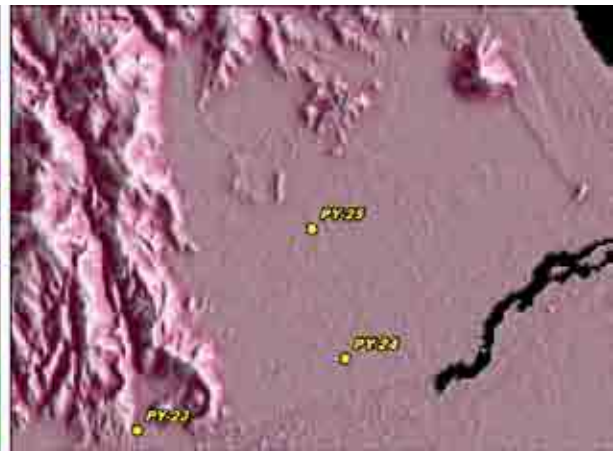
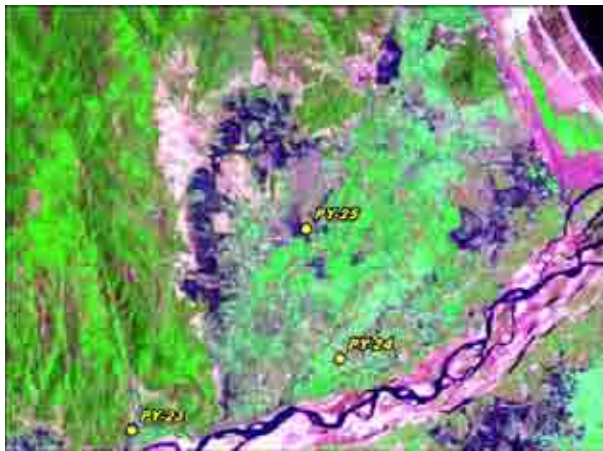
Topography: Small mountain in flat land.

Land use: Farmland (paddy field).

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/7/10	Location (UTM)		Elev	Geological Unit			
Point No.	PY-26	X (m)	Y (m)	(m)	VSW Index	V	S	W
		311,997	1,438,707	12				

Description

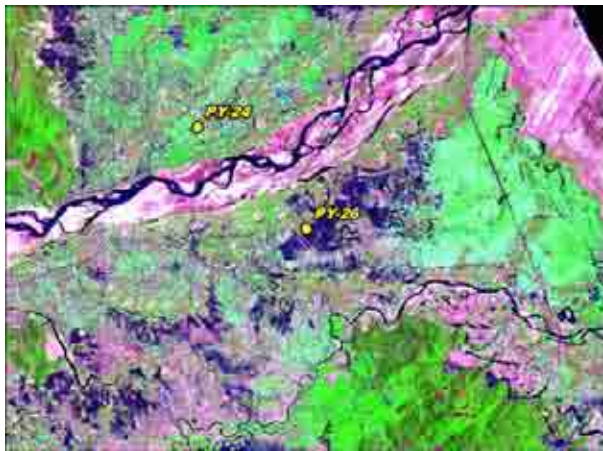
Water use in Alluvium plain

Water use: Dug well for daily use with filter (Charcoal, gravel and sand), irrigation canal from dam.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/7/10	Location (UTM)		Elev	Geological Unit			
Point No.	PY-27	X (m)	Y (m)	(m)	VSW Index	V	S	W
		290,001	1,436,340	71				

Description

Soil in Quarternary volcanic rock

Soil: Brown colored soil.

Land use: Farmland (mainly cassava).

Topography: Flat land with gentle relief, mountain with steep ridge in Triassic volcanic rock?

Water use: Deep dug well, rain water only for cassava.

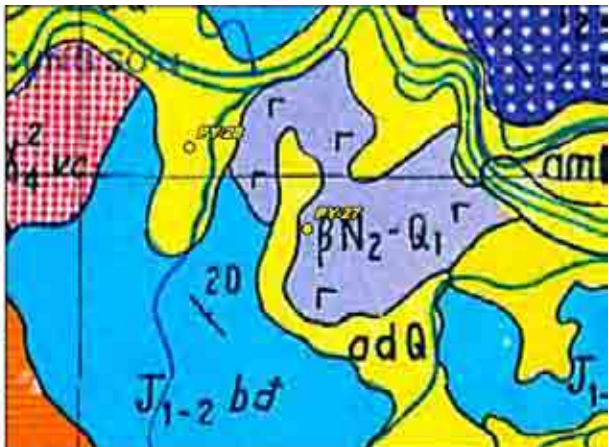
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/7/10	Location (UTM)		Elev	Geological Unit			
Point No.	PY-28	X (m)	Y (m)	(m)	VSW Index	V	S	W
		286,484	1,438,801	38				

Description

Soil in Alluvium near Jurassic sedimentary rock.

Soil: Light gray colored soil.

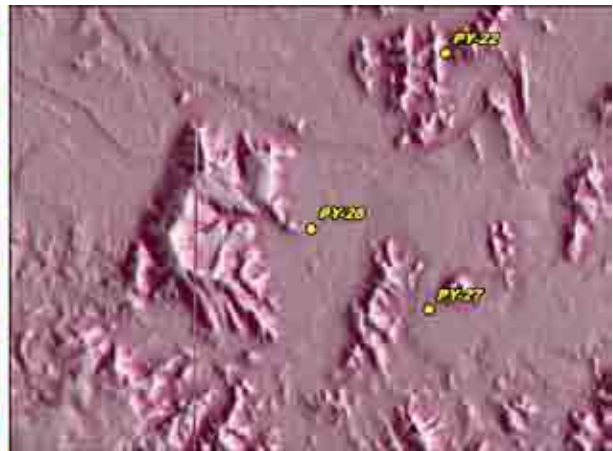
Land use: Farmland (cassava and sugarcane).

Water use: Dug well with filter (D = 9m).

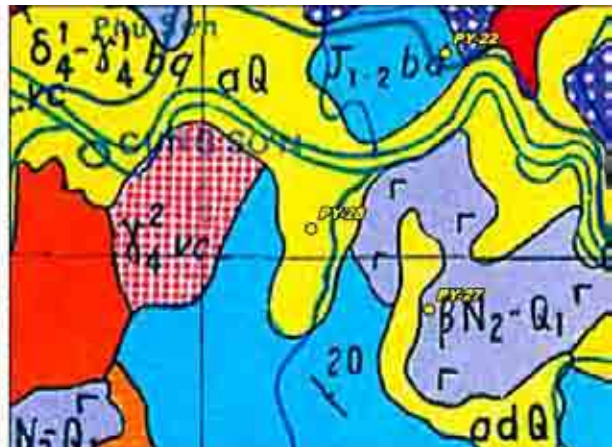
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/7/10	Location (UTM)		Elev	Geological Unit			
Point No.	PY-29	X (m)	Y (m)	(m)	VSW Index	V	S	W
		273,582	1,437,032	193				

Description

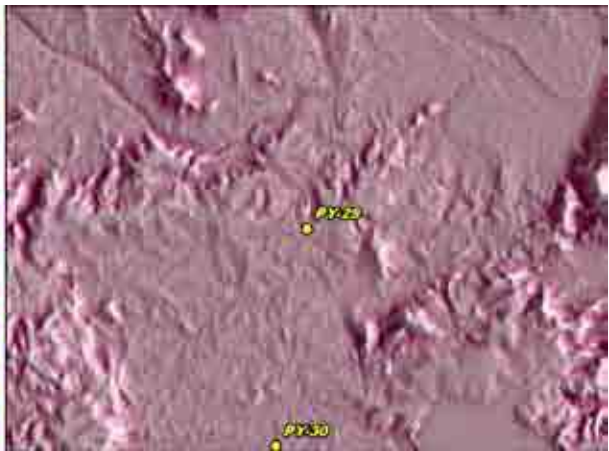
Water supply system in village

Water use: Water supply system operated by private company, water tank.
 Land use: Farmland (sugarcane field) in brown colored soil.
 Topography: Gentle slope hill.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/7/10	Location (UTM)		Elev	Geological Unit			
Point No.	PY-30	X (m)	Y (m)	(m)	VSW Index	V	S	W
		272,644	1,430,450	187				

Description

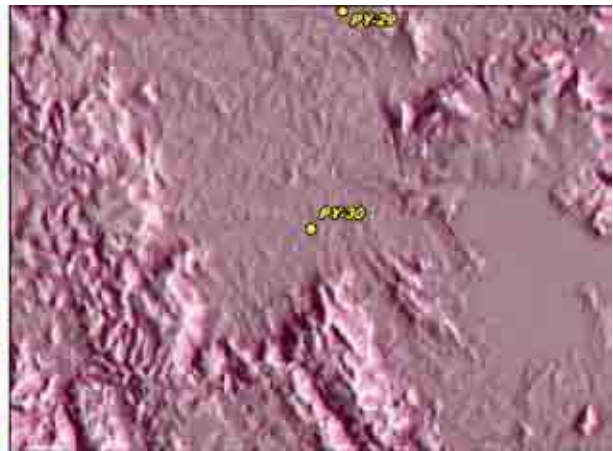
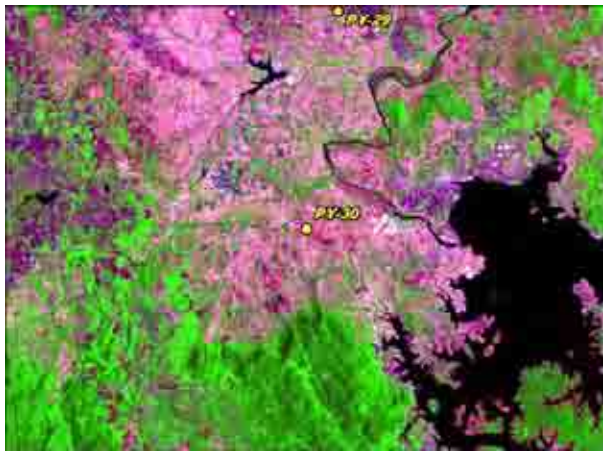
Landuse in Cretaceous granite area?

Land use: Farmland (paddy field in low land near stream, sugarcane on slope).

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/7/10	Location (UTM)		Elev	Geological Unit			
Point No.	PY-31	X (m)	Y (m)	(m)	VSW Index	V	S	W
		262,646	1,434,760	411				

Description

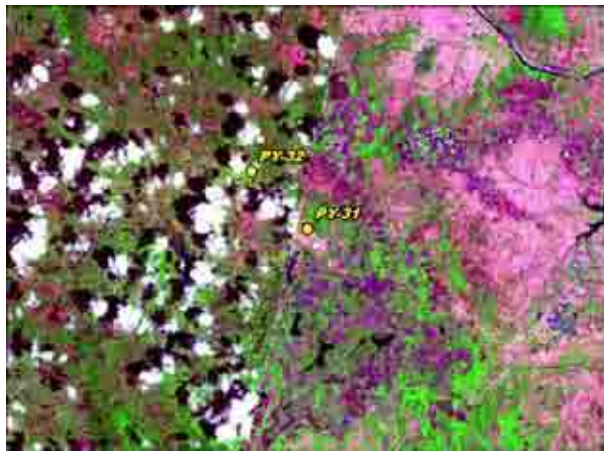
Boulder of Permian granite

Lithology: Medium grained hornblend granite, silicification with pyrite (rare).

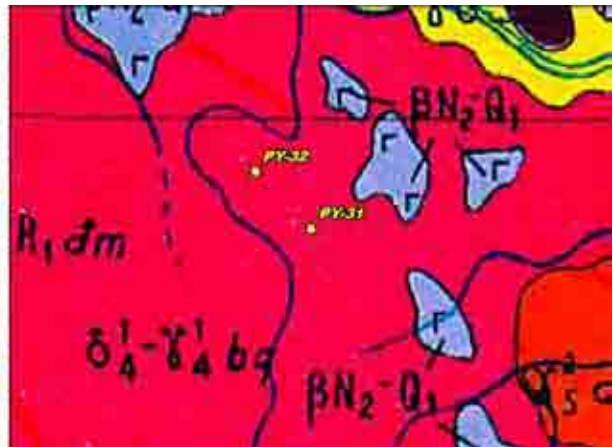
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/29	Location (UTM)		Elev	Geological Unit			
Point No.	PY-32	X (m)	Y (m)	(m)	VSW Index	V	S	W
		290,492	1,444,100	83				

Description

Topography in Triassic granite and Quarternary volcanic rock

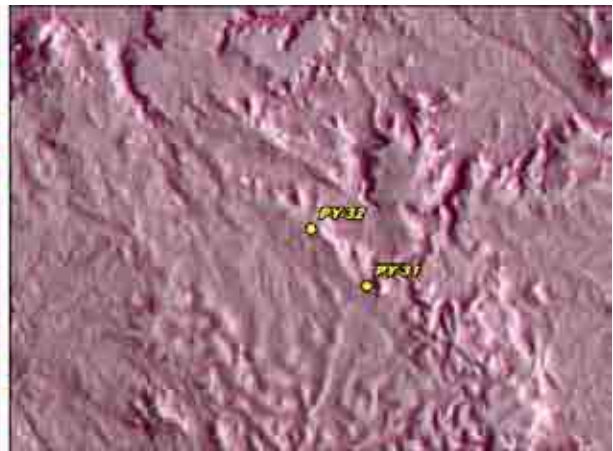
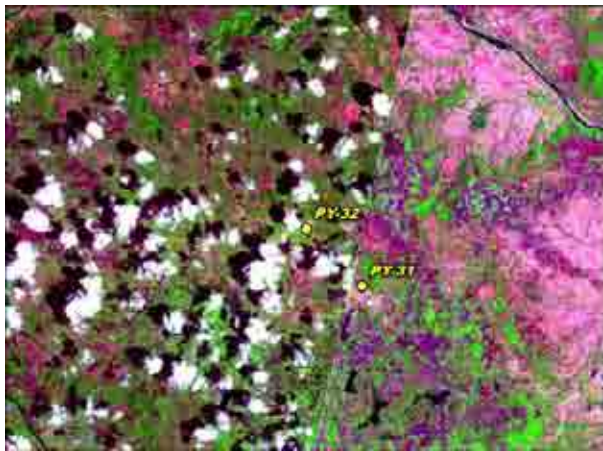
Topography: Gentle relief hill with reddish colored soil.

Land use: Farmland (mainly sesami)

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/25	Location (UTM)		Elev	Geological Unit			
Point No.	KH-01	X (m)	Y (m)	(m)	VSW Index	V	S	W
		297,495	1,335,311	32				

Description

Agricultural land in white colored pixels

Soil: light gray colored, almost quartz grain, dry.

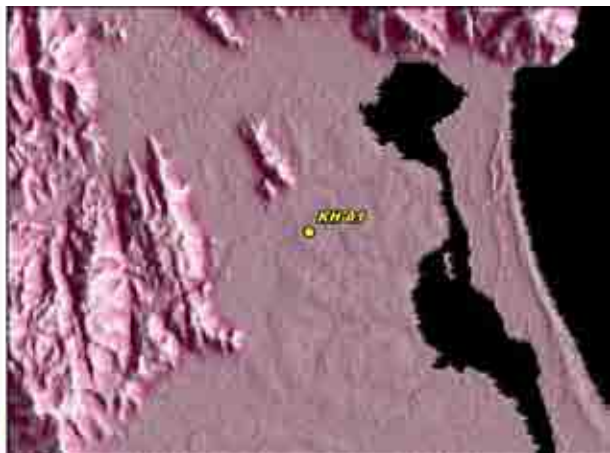
Land use: Farmland (vegetables, flowers and fruits, mango trees in the picture below).

Water use: Dug well (D = 4.5m), salinized water, need of filtering for drinking.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/25	Location (UTM)		Elev	Geological Unit			
Point No.	KH-02	X (m)	Y (m)	(m)	VSW Index	V	S	W
		303,430	1,328,184	5				

Description

Flat land along inland sea

Land use: Fish breeding ponds for shrimp, grass land for pasturage, farmland (paddy).

Soil: light gray colored, quartz and feldspar grain, dry.

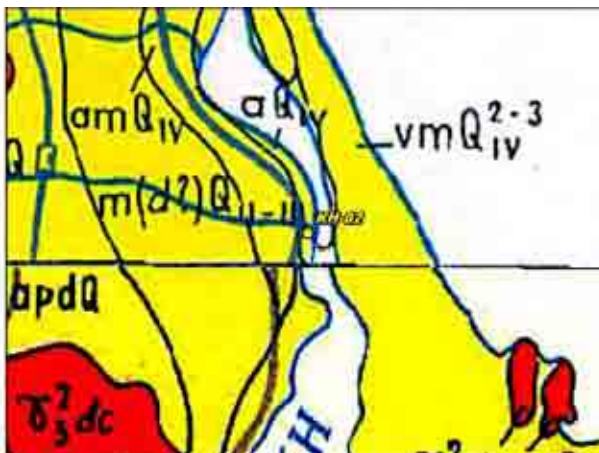
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/25	Location (UTM)		Elev	Geological Unit			
Point No.	KH-03	X (m)	Y (m)	(m)	VSW Index	V	S	W
		295,737	1,316,881	10				

Description

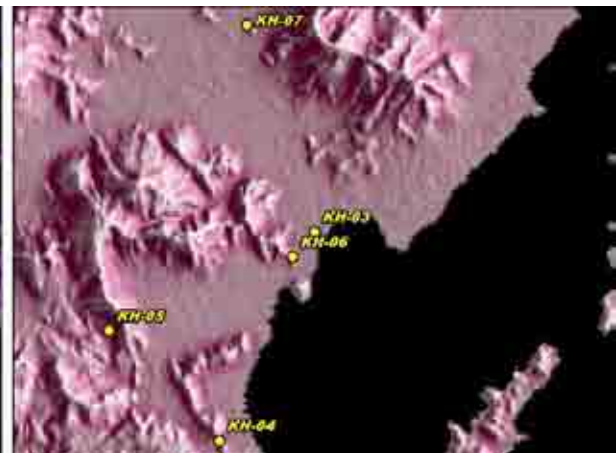
Flat land near the mouth of a river (high Water Index area)

Land use: Fish breeding ponds for shrimp.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/25	Location (UTM)		Elev	Geological Unit			
Point No.	KH-04	X (m)	Y (m)	(m)	VSW Index	V	S	W
		292,892	1,310,617	26				

Description

Outcrop of Jurassic or Cretaceous volcanic rock

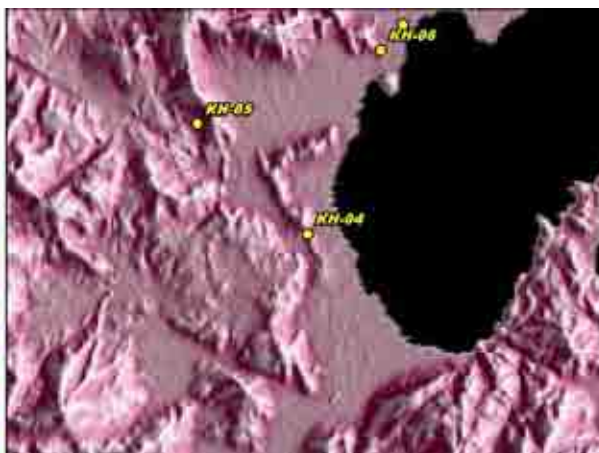
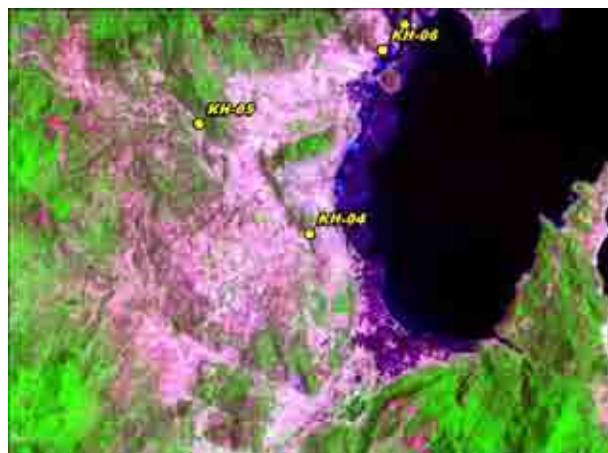
Lithology: Rhyolitic lava, vertical joint.

Topography: Gentle hill extend NNW - SSE direction.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/25	Location (UTM)		Elev	Geological Unit			
<u>Point No.</u>	<u>KH-05</u>	X (m)	Y (m)	(m)	VSW Index	V	S	W
		289,586	1,313,912	80				

Description

Cretaceous diorite boulder

Lithology: Medium to fine grained quartz diorite.

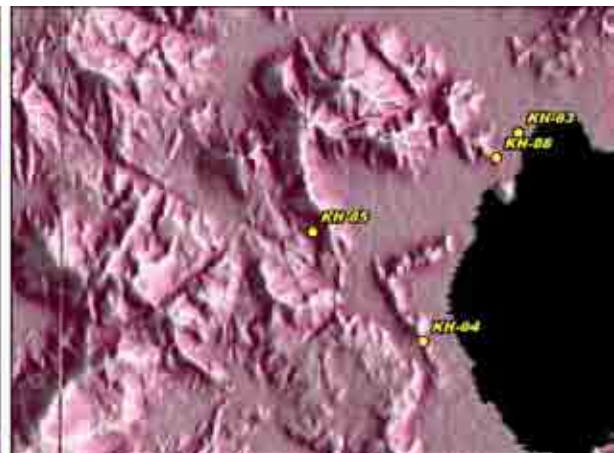
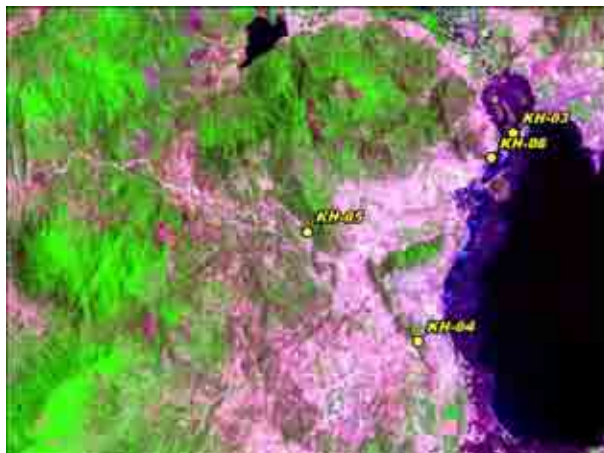
Topography: Many cracks (NNE-SSW).

Land use: Farmland (corn field on a slope of mountain).

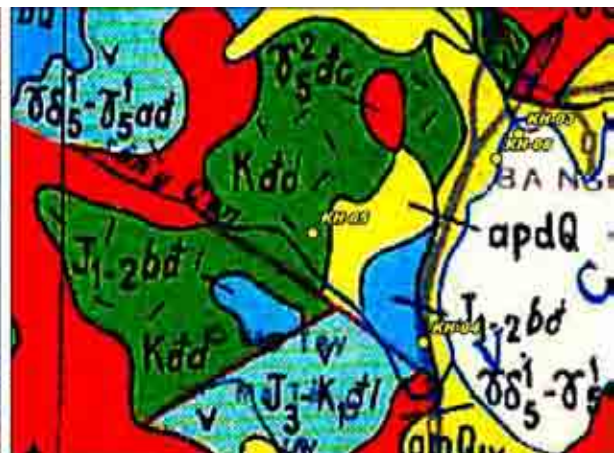
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/25	Location (UTM)		Elev	Geological Unit			
Point No.	KH-06	X (m)	Y (m)	(m)	VSW Index	V	S	W
		295,074	1,316,128	17				

Description

Outcrop of Cretaceous volcanic rock

Lithology: Andesitic lapilli tuff, bedded and joint, weak silicified.

Land use: Quarry.

Topography: Gentle hill - mountain.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/25	Location (UTM)		Elev	Geological Unit			
<u>Point No.</u>	<u>KH-07</u>	X (m)	Y (m)	(m)	VSW Index	V	S	W
		293,720	1,323,084	17				

Description

Outcrop of Cretaceous volcanic rock

Lithology: Phylite lave, many joint (N45E), silicified with pyrite, cracks filled by green colored clay (chlorite?).

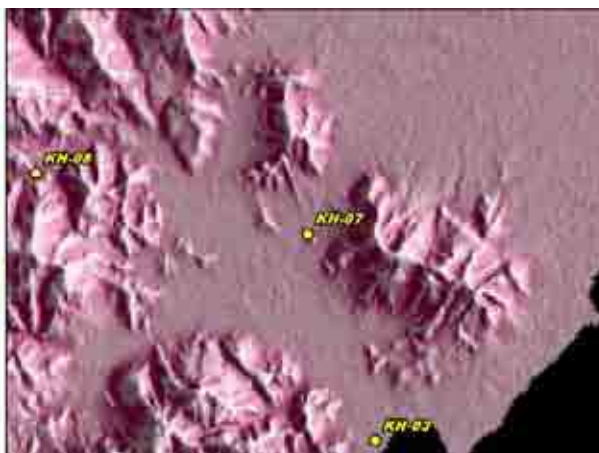
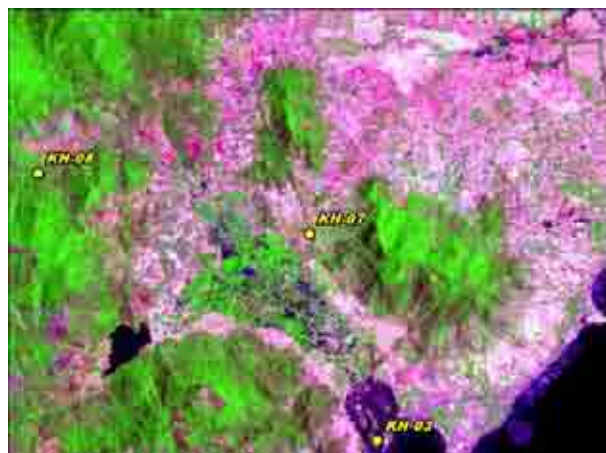
Land use: Quarry.

Topography: Gentle hill - mountain.

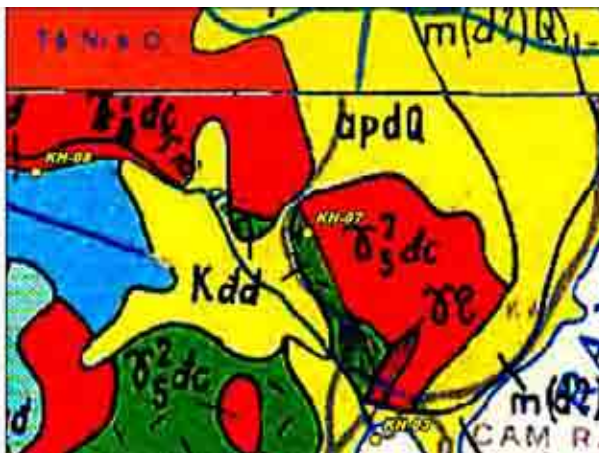
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/25	Location (UTM)		Elev	Geological Unit			
<u>Point No.</u>	<u>KH-08</u>	X (m)	Y (m)	(m)	VSW Index	V	S	W
		285,609	1,324,899	102				

Description

Outcrop of Cretaceous granite along the river

Lithology: Medium grained hornblende granite, many joint (N10E, N60W, N60E), alteration along calcite veinlets.
 Surface water: Stream (water rich).

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/25	Location (UTM)		Elev	Geological Unit			
Point No.	KH-09	X (m)	Y (m)	(m)	VSW Index	V	S	W
		283,189	1,324,935	568				

Description

Landscape of Cretaceous granite area

Topography: Steep mountain.

Land use: Forest, forestation and farmland (banana).

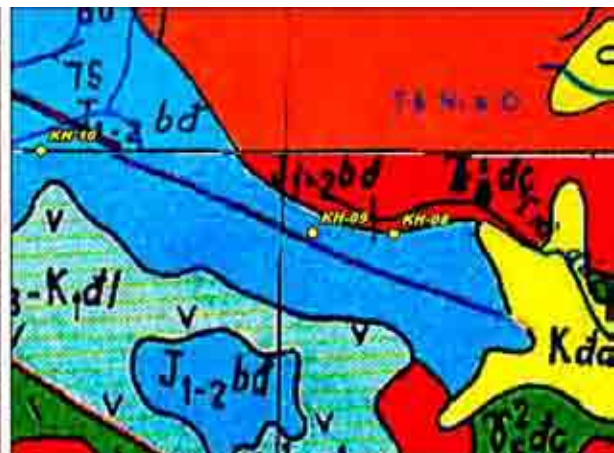
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/25	Location (UTM)		Elev	Geological Unit			
<u>Point No.</u>	<u>KH-10</u>	X (m)	Y (m)	(m)	VSW Index	V	S	W
		275,068	1,327,409	357				

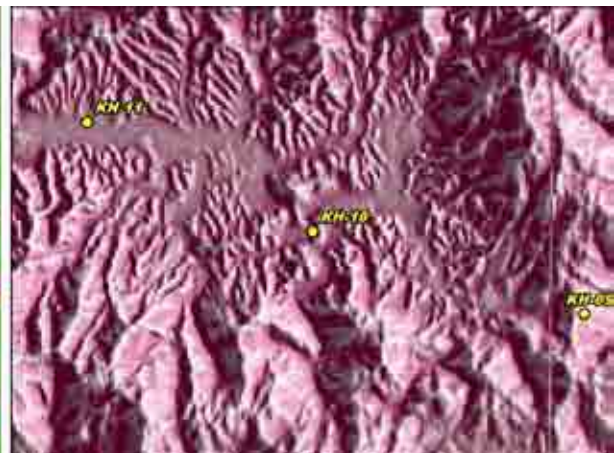
Description

Landscape of Jurassic sedimentary rock area
 Topography: Gently hill - mountain and rough terrain.
 Land use: Forest, forestation and farmland (banana on slope and sugarcane plantation in flat land along a river).

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/25	Location (UTM)		Elev	Geological Unit			
Point No.	KH-11	X (m)	Y (m)	(m)	VSW Index	V	S	W
		268,330	1,330,692	343				

Description

Outcrop of Jurassic sedimentary rock

Lithology: Alternation of siltstone / sandstone, well and monotonous bedded, N80E 70N.

Land use: Farmland (coffee and pepper field).

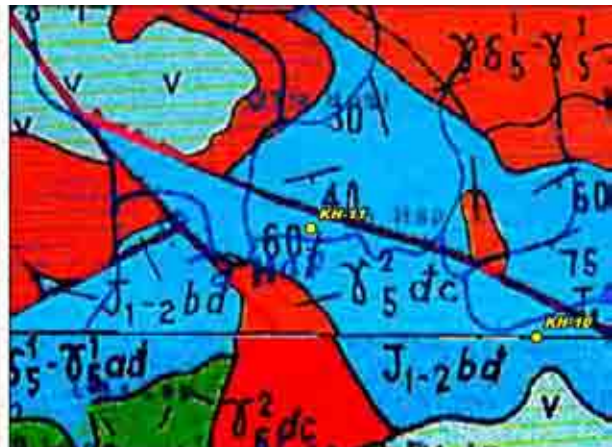
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/26	Location (UTM)		Elev	Geological Unit			
Point No.	KH-12	X (m)	Y (m)	(m)	VSW Index	V	S	W
		287,979	1,353,788	14				

Description

Land use in Alluvium

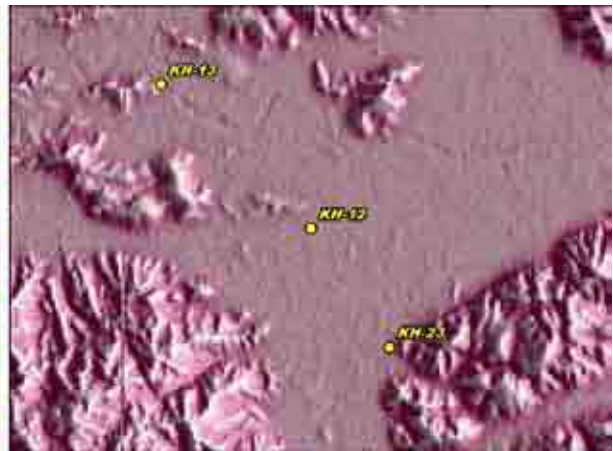
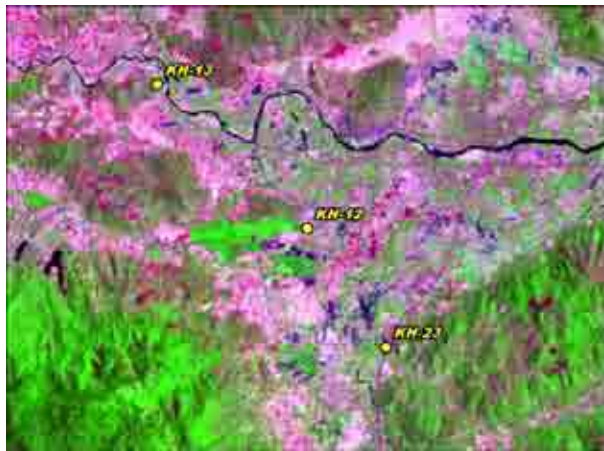
Land use: Farmland (paddy field).

Water supply: Dug well for drinking (D = 4.5m), agricultural water supplied from dam.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/26	Location (UTM)		Elev	Geological Unit			
Point No.	KH-13	X (m)	Y (m)	(m)	VSW Index	V	S	W
		283,499	1,358,159	10				

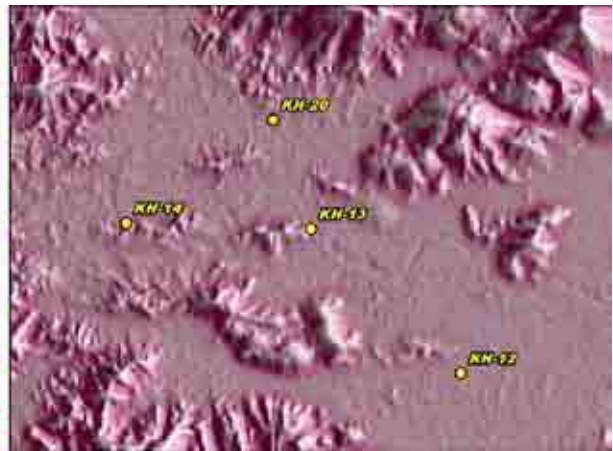
Description

Small mountain of Cretaceous volcanic rock
 Topography: Old river channel.
 Land use: Fish breeding pond and farmland (banana).

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/26	Location (UTM)		Elev	Geological Unit			
Point No.	KH-14	X (m)	Y (m)	(m)	VSW Index	V	S	W
		277,972	1,358,335	26				

Description

Outcrop of Cretaceous sedimentary rock
 Lithology: dark gray colored siltstone (shale).

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/26	Location (UTM)		Elev	Geological Unit			
Point No.	KH-15	X (m)	Y (m)	(m)	VSW Index	V	S	W
		272,828	1,358,271	27				

Description

River along lineament zone

Surface water: River, volume of water and vegetation are rich.
 Topography: Gentle hill - mountain, steep mountain in granite area.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/26	Location (UTM)		Elev	Geological Unit			
Point No.	KH-16	X (m)	Y (m)	(m)	VSW Index	V	S	W
		267,106	1,356,545	54				

Description

Outcrop of Jurassic sedimentary rock

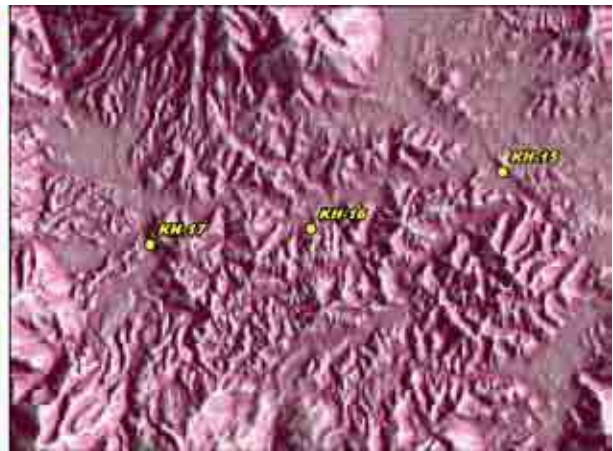
Lithology: brown colored siltstone (shale) with muscovite rarely, well bedded, N45E vertical.

Land use: Farmland (corn field in narrow flat land along the river and on slope, peach and wheat field).

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/26	Location (UTM)		Elev	Geological Unit			
Point No.	KH-17	X (m)	Y (m)	(m)	VSW Index	V	S	W
		262,292	1,356,071	59				

Description

Outcrop of Jurassic sedimentary rock along the river

Lithology: Alternation of dark gray colored siltstone (shale) / brown colored sandstone, well bedded, N55E 55N.

Surface water: Big river, volume of water is rich, pollution of bacteria from domestic wastewater.

Topography: Gentle hill - mountain, steep mountain in granite area.

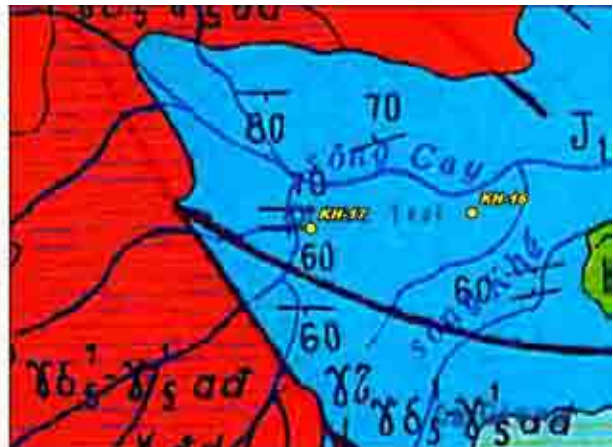
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/26	Location (UTM)		Elev	Geological Unit			
Point No.	KH-18	X (m)	Y (m)	(m)	VSW Index	V	S	W
		278,233	1,372,786	57				

Description

Boundary of Jurassic sediments / Cretaceous granite

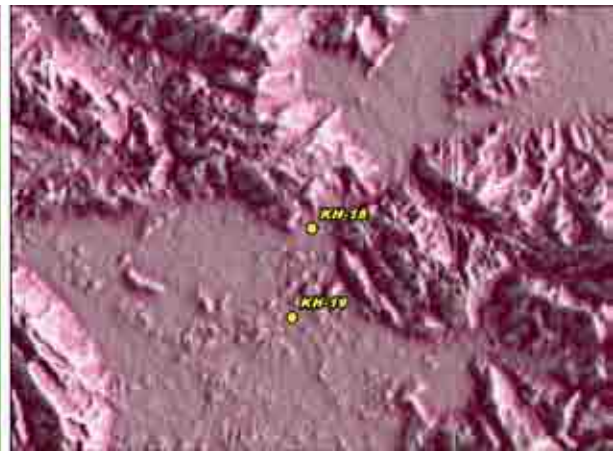
Topography: steep slope in granite and gentle slope in sedimentary rock.

Land use: Forestation and farmland (banana).

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/26	Location (UTM)		Elev	Geological Unit			
Point No.	KH-19	X (m)	Y (m)	(m)	VSW Index	V	S	W
		277,630	1,370,104	30				

Description

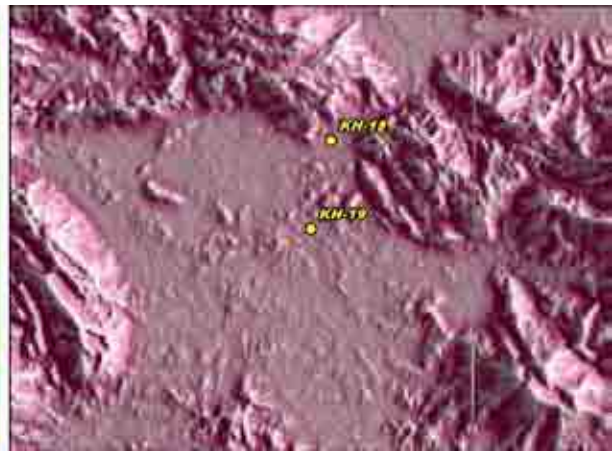
Contact of Jurassic sediments / Cretaceous granite

Lithology: Medium grained granite (aplite?), brown colored shale which are hard and compact by thermal.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/26	Location (UTM)		Elev	Geological Unit			
Point No.	KH-20	X (m)	Y (m)	(m)	VSW Index	V	S	W
		282,369	1,361,455	15				

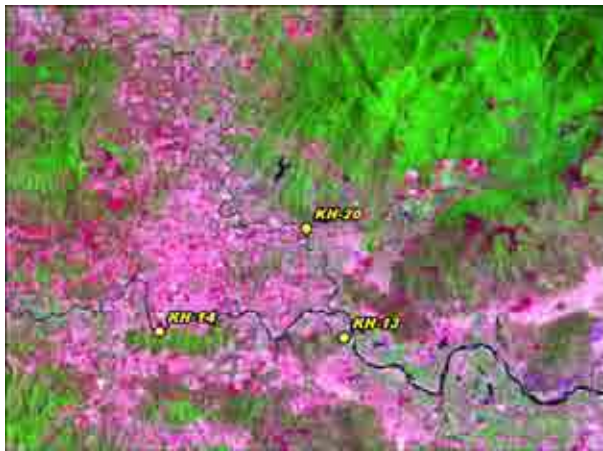
Description

Land use in alluvium of mountainous basin
 Land use: Farmland (banana, elephant grass and sugarcane).
 Topography: gentle hill in Jurassic sediments area and steep mountain in Cretaceous granite area.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/26	Location (UTM)		Elev	Geological Unit			
Point No.	KH-21	X (m)	Y (m)	(m)	VSW Index	V	S	W
		293,229	1,360,680	16				

Description

Dam site in Cretaceous volcanics and granite

Topography: Steep mountain in granite area, gently mountain in volcanics and flat land.

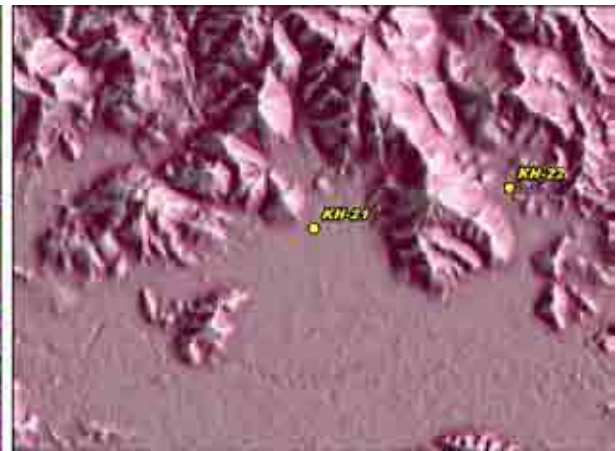
Land use: Farmland (paddy field).

Water use: Agricultural water supplied from dam.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/26	Location (UTM)		Elev	Geological Unit			
Point No.	KH-22	X (m)	Y (m)	(m)	VSW Index	V	S	W
		299,067	1,361,912	17				

Description

Land use in Jurassic and Cretaceous volcanics

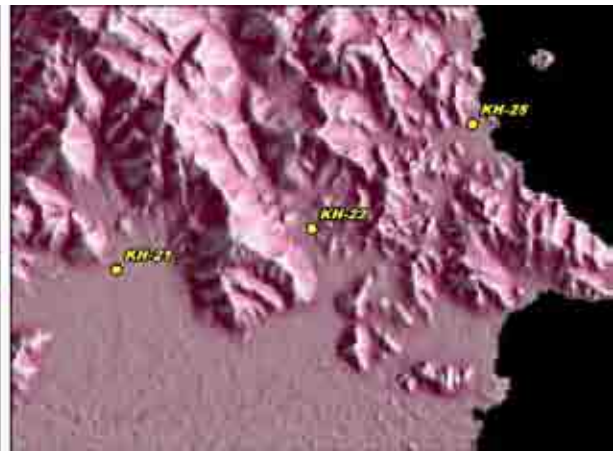
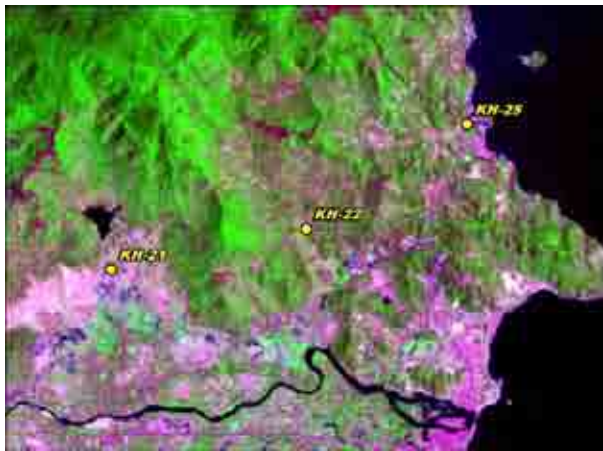
Land use: Farmland (vegetables) and quarry.

Water use: Irrigation from well water by water hose.

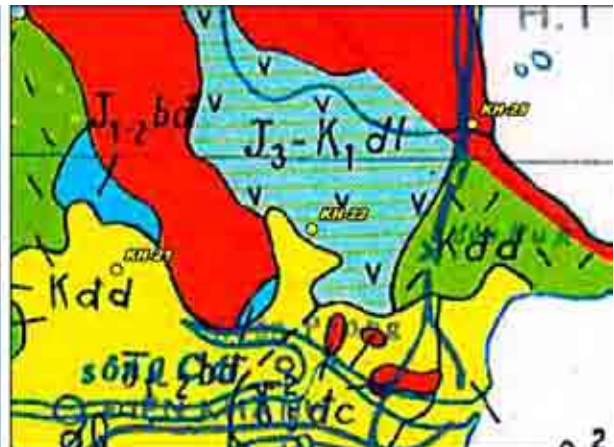
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/26	Location (UTM)		Elev	Geological Unit			
Point No.	KH-23	X (m)	Y (m)	(m)	VSW Index	V	S	W
		290,328	1,350,200	19				

Description

Outcrop of Jurassic and Cretaceous volcanic rock

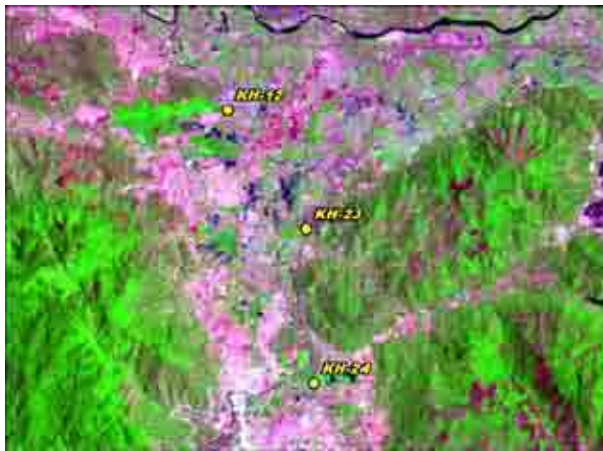
Lithology: Andesitic lave and tuff, well bedded.

Land use: Quarry and farmland (mango).

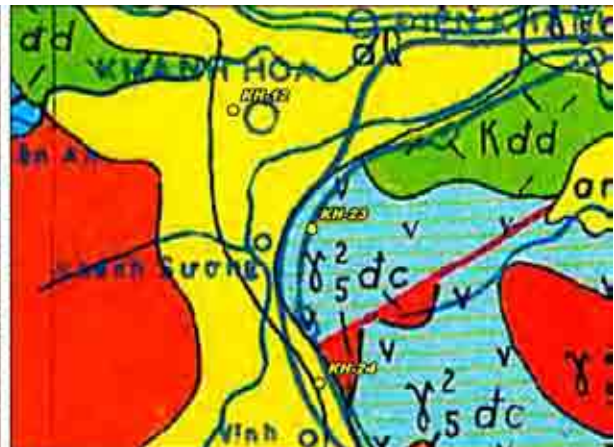
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/26	Location (UTM)		Elev	Geological Unit			
Point No.	KH-24	X (m)	Y (m)	(m)	VSW Index	V	S	W
		290,550	1,345,525	25				

Description

Valley along lineament

Topography: Steep mountain and valley extend N50E, flat land in the valley.
 Land use: Farmland (paddy field).

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/27	Location (UTM)		Elev	Geological Unit			
Point No.	KH-25	X (m)	Y (m)	(m)	VSW Index	V	S	W
		303,870	1,365,079	5				

Description

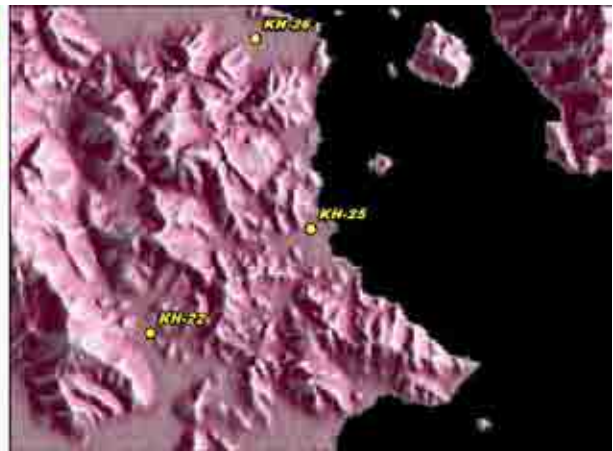
Topographic shape in Jurassic volcanics and Cretaceous granite

Topography: Sharp ridge in Jurassic volcanic rock and gentle ridge in Cretaceous granite.

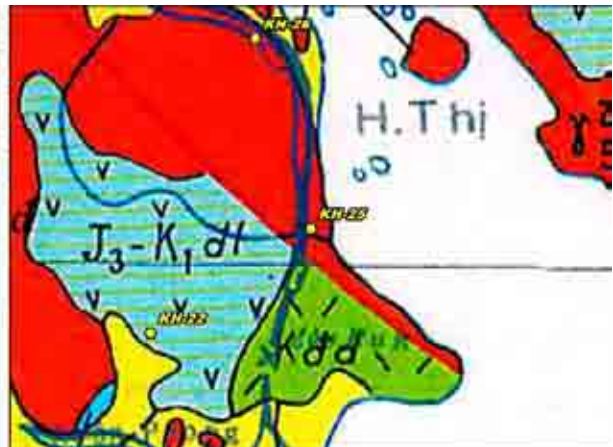
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/27	Location (UTM)		Elev	Geological Unit			
Point No.	KH-26	X (m)	Y (m)	(m)	VSW Index	V	S	W
		302,210	1,370,835	6				

Description

Land use in flat land along coast

Land use: Salt field.

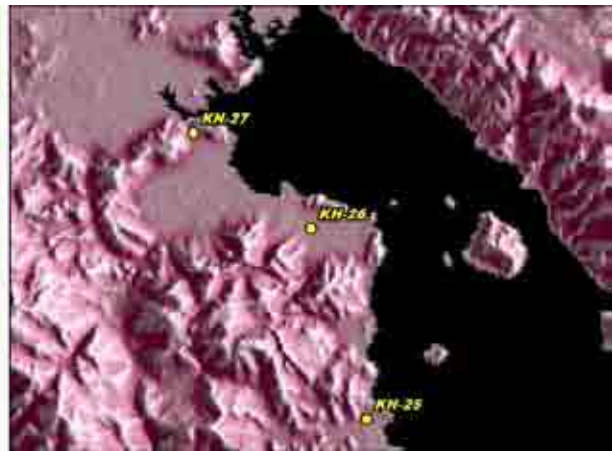
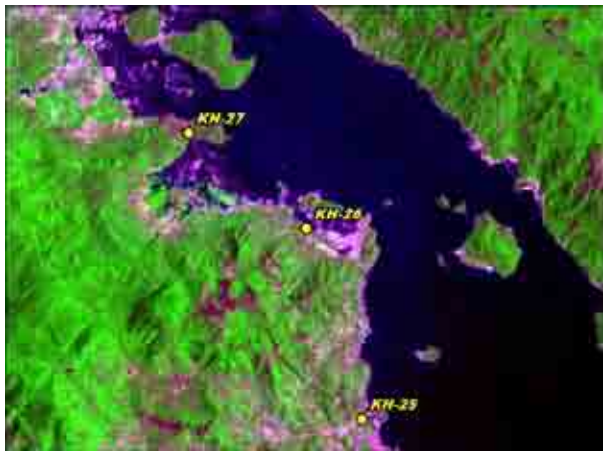
Water use: Dug well (D = 4 to 5m), no water in dry season, salinity problem in deeper wells.

Topography: Steep mountain in granite area.

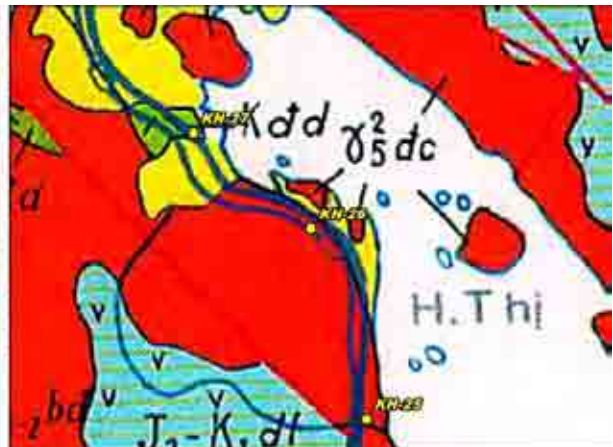
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/27	Location (UTM)		Elev	Geological Unit			
Point No.	KH-27	X (m)	Y (m)	(m)	VSW Index	V	S	W
		298,694	1,373,735	26				

Description

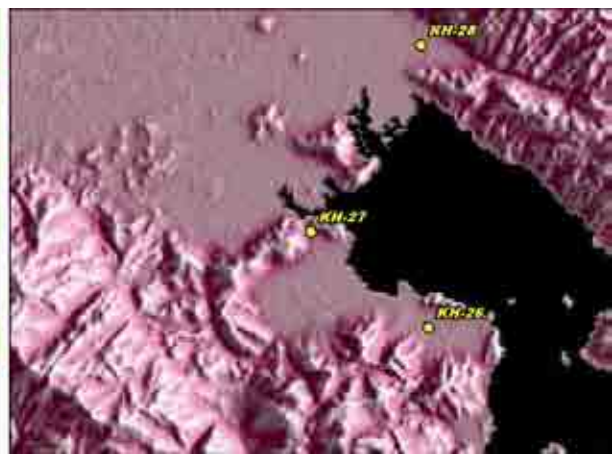
Outcrop of Cretaceous volcanic rock

Lithology: Dark gray colored silicified rock (andesitic rock?) and medium to coarse grained granite boulder.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/27	Location (UTM)		Elev	Geological Unit			
Point No.	KH-28	X (m)	Y (m)	(m)	VSW Index	V	S	W
		301,987	1,379,386	3				

Description

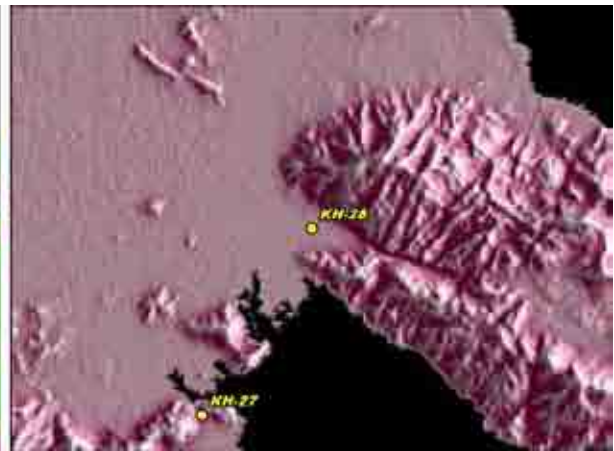
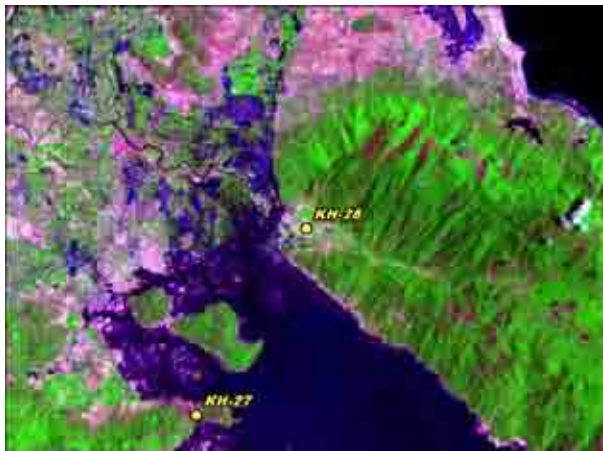
Valley along lineament

Topography: Steep granite mountain and valley exted E-W.
 Land use: Farmland (paddy field) in flat land.
 Water use: Dug well, shallow water level.

Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/27	Location (UTM)		Elev	Geological Unit			
Point No.	KH-29	X (m)	Y (m)	(m)	VSW Index	V	S	W
		288,748	1,387,567	20				

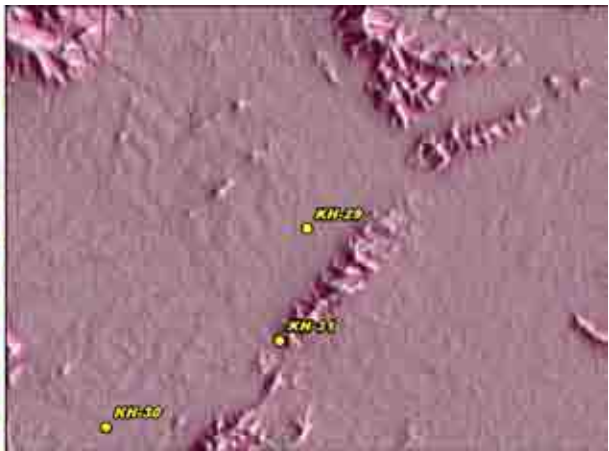
Description

Small hill of Jurassic sedimentary rock
 Topography: Small hills extend N40E in flat land.
 Land use: Farmland (paddy field).

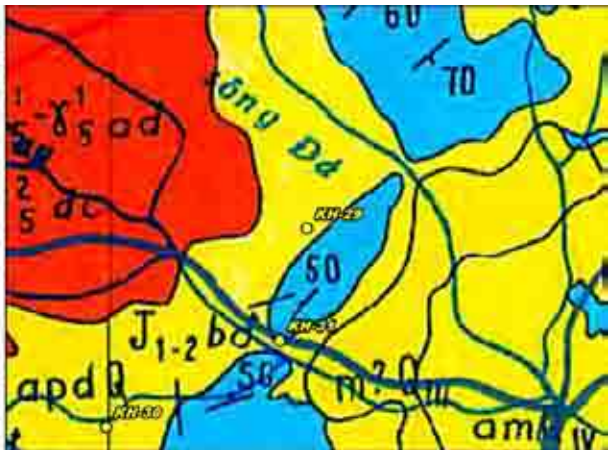
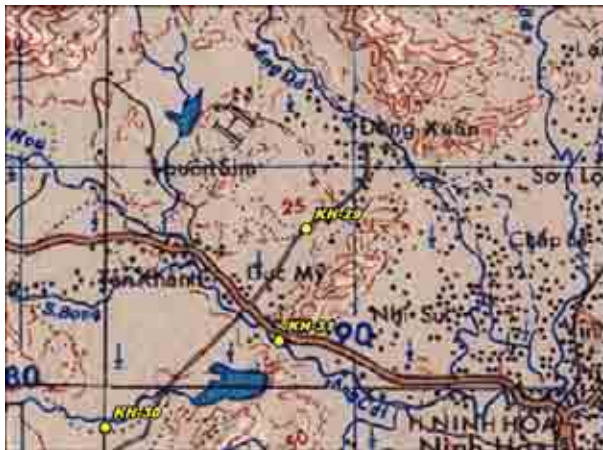
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/27	Location (UTM)		Elev	Geological Unit			
Point No.	KH-30	X (m)	Y (m)	(m)	VSW Index	V	S	W
		282,742	1,381,555	34				

Description

Land use in Jurassic sedimentary rock

Land use: Farmland (Sugarcane and corn).

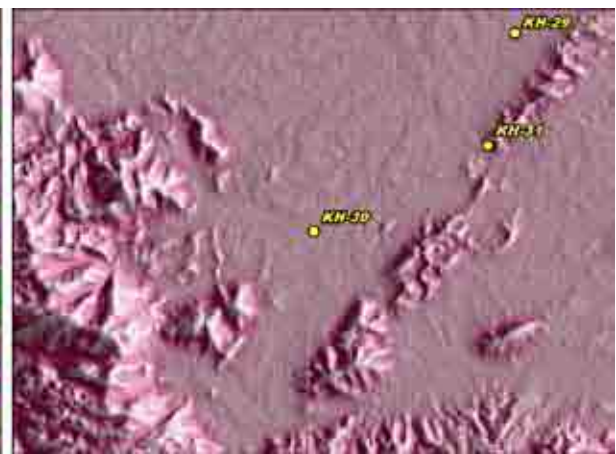
Topography: Flat land with gentle hill and boulders of Jurassic rock.

Surface water: River, volume of water is moderate, high turbidity.

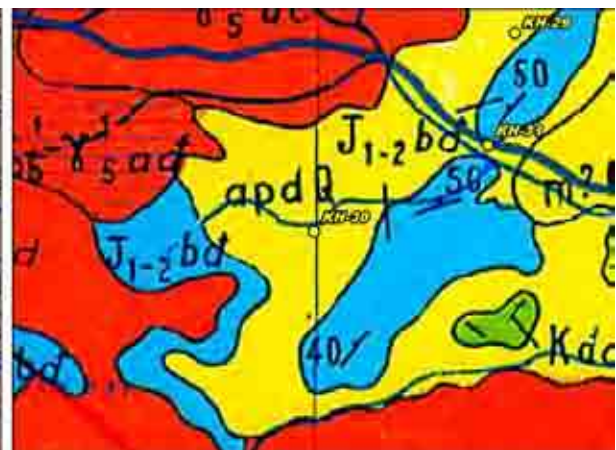
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/27	Location (UTM)		Elev	Geological Unit			
Point No.	KH-31	X (m)	Y (m)	(m)	VSW Index	V	S	W
		287,930	1,384,169	24				

Description

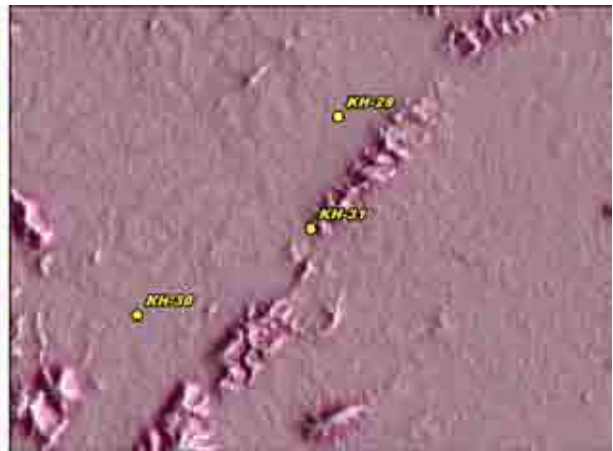
Outcrop of Jurassic sedimentary rock

Lithology: Dark gray colored siltstone (shale) which is hard and compact by silicification of quartz vein? or aplite dyke?
 Topography: Small hill - mountain extend NE-SW.

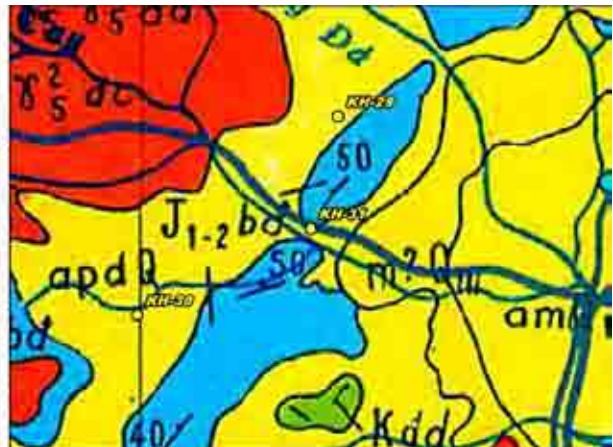
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/27	Location (UTM)		Elev	Geological Unit			
Point No.	KH-32	X (m)	Y (m)	(m)	VSW Index	V	S	W
		302,460	1,395,348	10				

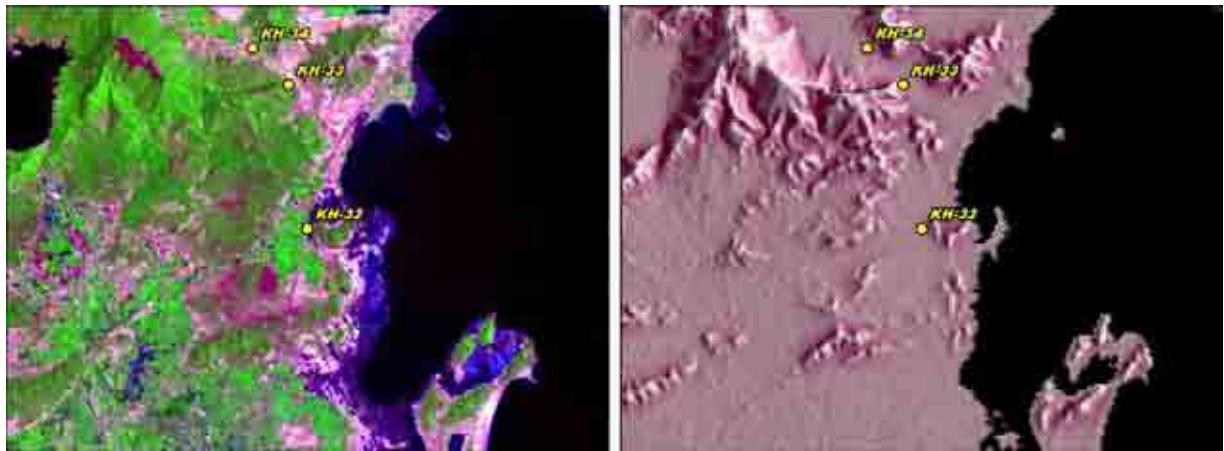
Description

Land use in flat land along coast
 Land use: Farmland (Fruit, paddy field in flat land).

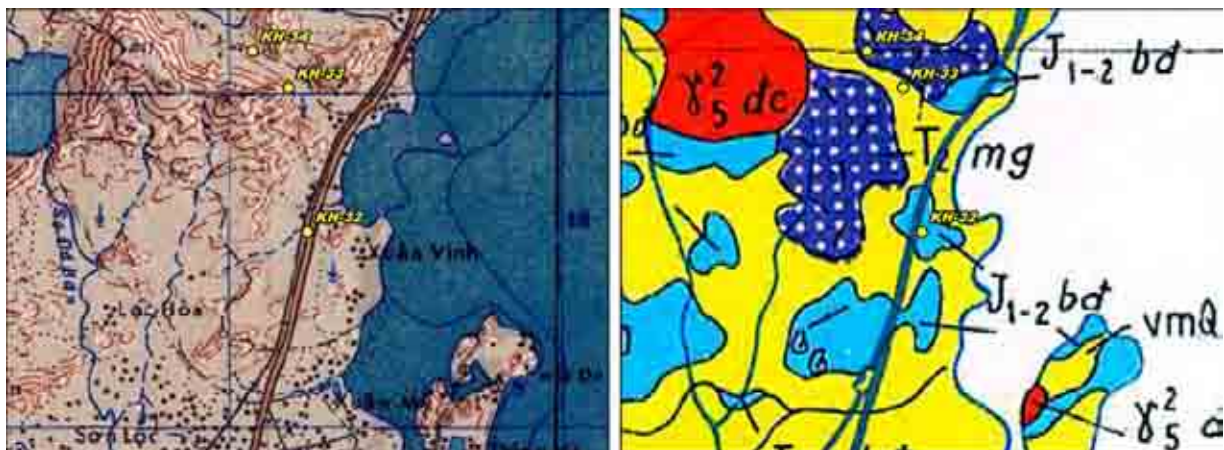
Photo

(No Picture)

Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/27	Location (UTM)		Elev	Geological Unit			
Point No.	KH-33	X (m)	Y (m)	(m)	VSW Index	V	S	W
		301,902	1,399,707	31				

Description

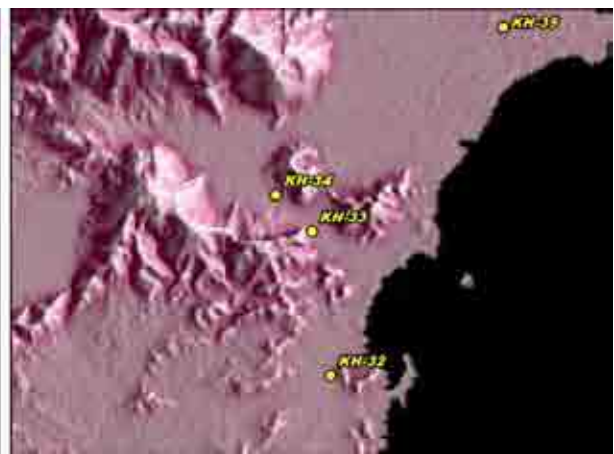
Outcrop of Triassic Volcanic rock

Lithology: Strongly silicified rock (medium grained granite?) with quartz veins.

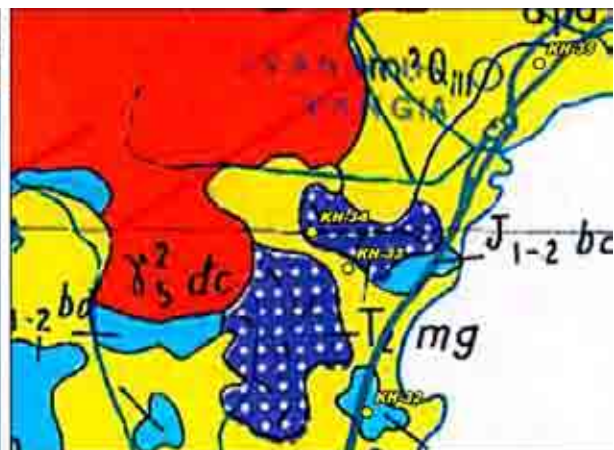
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/27	Location (UTM)		Elev	Geological Unit			
Point No.	KH-34	X (m)	Y (m)	(m)	VSW Index	V	S	W
		300,824	1,400,813	29				

Description

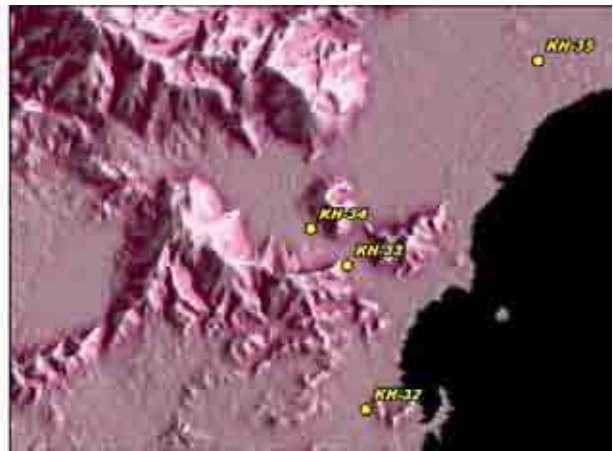
Topography of Triassic volcanic rock

Topography: Steep mountain with cracks (N-S).

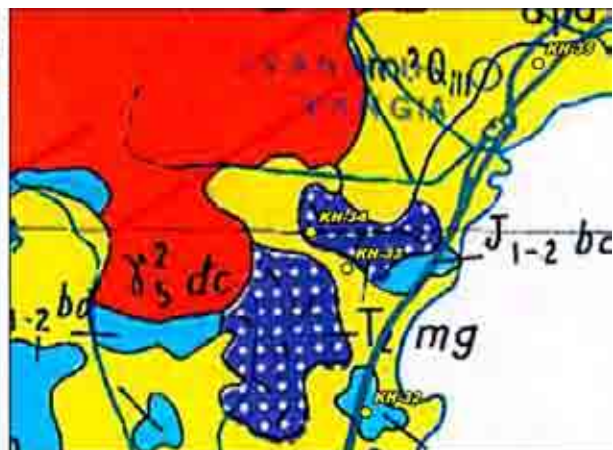
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/27	Location (UTM)		Elev	Geological Unit			
Point No.	KH-35	X (m)	Y (m)	(m)	VSW Index	V	S	W
		307,616	1,405,903	10				

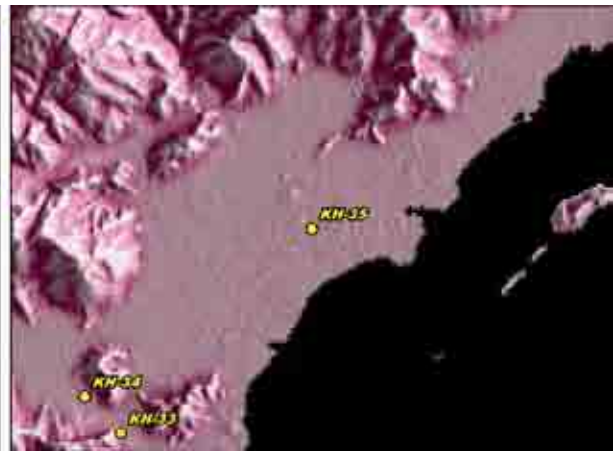
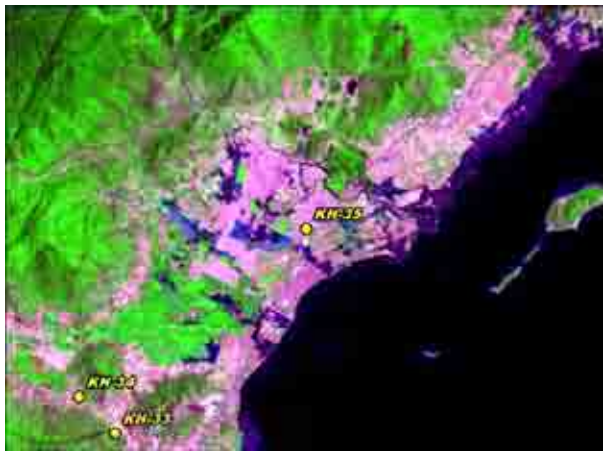
Description

Land use in flat land of granite area
 Land use: Farmland (paddy field).
 Topography: Steep mountain in granite area.

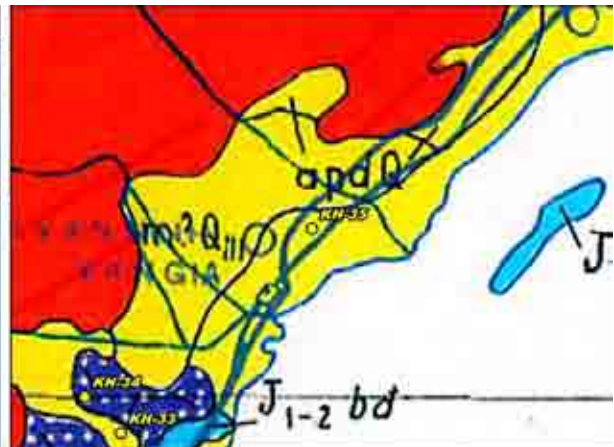
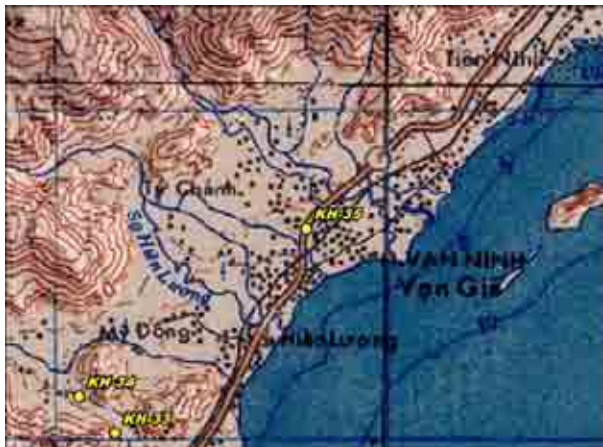
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/27	Location (UTM)		Elev	Geological Unit			
Point No.	KH-36	X (m)	Y (m)	(m)	VSW Index	V	S	W
		326,475	1,404,643	11				

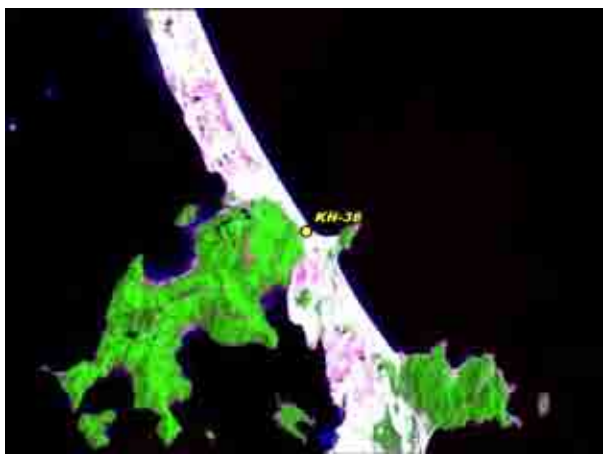
Description

Boulder of granodiorite
 Lithology: Medium grained quartz diorite.
 Soil: Medium to coarse grained quartz sand, transparent.

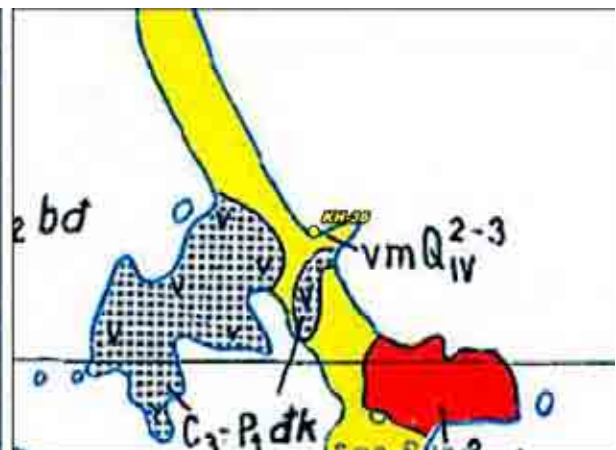
Photo



Satellite Image



Existing Map



Result of Field Geological Survey and Ground Truth for the Satellite Image Analysis

Date:	2007/6/27	Location (UTM)		Elev	Geological Unit			
Point No.	KH-37	X (m)	Y (m)	(m)	VSW Index	V	S	W
		321,638	1,415,238	3				

Description

Land use in sand band

Land use: Fish breeding pond (shrimp) and farmland (Vegetable).
Soil: Medium to coarse grained quartz sand.

Photo



Satellite Image



Existing Map

