

A 5 . 事業事前計画表

A 5. 事業事前計画表（準備調査時）

1. 案件名	
エチオピア国緊急給水計画	
2. 要請の背景（協力の必要性・位置付け）	
<p>「エ」国は、半乾燥地に位置づけられ、もともと旱魃の危機に晒される度合いが高く、安全な水へのアクセス率は 22% と非常に低い。さらに近年の気候変動の影響もあり、深刻な旱魃被害と同時に洪水被害が交互に発生しており、被害地域では給水状況及び衛生状況が悪化している。実際、2008 年 3 月にはオロミア州、ティグライ州、南部諸民族州、アムハラ州、アファール州、ソマリ州の一部の地域において、旱魃による衛生面の悪化、水不足による食料不足、栄養失調、家畜の死亡、急性下痢症、髄膜炎等の感染症が生じたとの情報がある。一方で、同年 12 月には、オロミア州、ティグライ州、南部諸民族州、アムハラ州、ソマリ州、ガンベラ州の一部の地域で乾季中の大雨による大洪水が発生しており、避難や急性下痢症の発生等衛生面が悪化した住民は 64 万人に達するとされている。このような状況を改善するため、「エ」国政府はわが国に気候変動対策に寄与する環境プログラム無償を要請したものである。</p>	
3. プロジェクト全体計画概要	
<p>（１）プロジェクト全体計画の目標（裨益対象の範囲及び規模）</p> <p>本プロジェクトは、上位目標を達成するために気候変動対策に関する機材調達を実施することとしている。これによりプロジェクト対象地域の気候変動対策（適応策）が向上し、住民の衛生環境が改善する。</p> <p>（２）プロジェクト全体計画の成果</p> <p>旱魃被害対象地域に安全な水が供給される AWD 被害地域に安全な水が供給される 洪水被害地域住民に安全な水が供給される 洪水被害対策が実施され洪水被害の発生が軽減される 既存給水施設の拡張により対象地域の給水率が向上する 既設井戸の機能が回復し、住民に安全な水が供給される</p> <p>（３）プロジェクト全体計画の主要活動</p> <p>機材を調達する。</p> <p>（４）投入（インプット）</p> <p>日本側 本案件：環境プログラム無償 8.00 億円</p> <p>「エ」国側 「エ」側要員の人件費 機材維持管理費の負担 調達機材の使用・維持管理状況に関するモニタリング体制の整備 給水施設拡張工事費用の負担</p> <p>（５）実施体制</p> <p>主管官庁：「エ」国水資源省 実施機関：ティグライ、オロミア、アファール、アムハラ、ソマリ及び南部諸民族の各州水資源局</p>	
4. 無償資金協力案件の内容	
A. 地下水揚水機材	
井戸掘削リグ（300m クラス）＋ツールス	2 台
クレーン付カーゴトラック（3t 吊）	2 台
B. 緊急給水用機材	
浄水剤	5,422,000 袋
給水車（6 m ³ ）	4 台
給水車（15 m ³ ）	9 台

移動式簡易浄水装置（8,000 リットル / 時）	46 台
移動式簡易浄水装置（12,000 リットル / 時）	31 台
プラスチックタンク（5 m ³ ）	106 個
プラスチックタンク（10 m ³ ）	106 個
C. 災害対策用機材	
ブルドーザー（20t クラス）	1 台
重機運搬車両	1 台
D. 給水施設拡張用機材	
給水施設建設資材 Semen Shershera	1 式
給水施設建設資材 Inceno Town	1 式
E. サービスリグ	
サービスリグ及びツールス	1 台

5. 外部要因リスク						
「エ」国の水・衛生国家政策に大幅な変更がない。						
6. 過去の類似案件からの教訓の活用						
なし						
7. プロジェクト全体計画の事後評価に係る提案						
（１）プロジェクト全体計画の目標達成を示す成果指標						
<table><tr><td>成果指標</td><td>現状（2009 年）</td><td>計画値（2011 年以降）</td></tr><tr><td>住民の水因性疾患発生率の低下</td><td>2.47%</td><td>2.34%</td></tr></table>	成果指標	現状（2009 年）	計画値（2011 年以降）	住民の水因性疾患発生率の低下	2.47%	2.34%
成果指標	現状（2009 年）	計画値（2011 年以降）				
住民の水因性疾患発生率の低下	2.47%	2.34%				
（２）その他の成果指標						
なし						
（３）評価のタイミング						
2011 年以降（機材稼動開始 1 年以降）						

A 6 . 参考資料・入手資料リスト

A 6. 参考資料・入手資料リスト

番号	名称	形態 図書・ビデオ 地図・写真等	オリジナル/ コピー	発行機関	発行年
1	Universal Access Program for Water Supply and Sanitation Services 2006 to 2012, International Calendar, Part I-Rural, Part II-Urban, Part III-Strategy	図書	コピー	Ministry of Water Resources	2006.12
2	Water Sector Development Programme 2002-2016	図書	コピー	Ministry of Water Resources	2002
3	Emergency Nutrition Intervention (CTC) in SNNPR	図書	コピー	South Nations Nationalities and People's Regional State Health Bureau	2009
4	A Proposal Intervention in a Prolonged Dry Season Areas of SNNPR	図書	コピー	South Nations, Nationalities and Peoples Regional Government, Water Resources Development Bureau	2008.3
5	Emergency Projects Progress Report Gurage zone, Mareqo woreda	図書	コピー	South Nations Nationalities and People's Regional Water Resource Development Bureau	2009.1
6	Emergency Preparedness & Response Plan	図書	コピー	South Nations Nationalities and People's Regional State Water Resource Development Bureau	2008.1
7	SNNPR Water Resources Development Bureau Report on Flood Affected Woreda in South Omo Zone	図書	コピー	South Nations Nationalities and People's Regional State Water Resource Development Bureau	2007.7
8	Water Supply Project Proposal for Three Rural Kebeles of Gedeo Zone (Emergency)	図書	コピー	South Nations Nationalities and People's Regional State Water Resource Development Bureau	2007.7
9	Cost Estimated of Damaged Top Works in Villages of AWD Case Areas of Kembata Tembaro Zone and Model Study on Ponds Usage in Alaba Woreda	図書	コピー	South Nations Nationalities and People's Regional State Water Resource Development Bureau	2007

番号	名称	形態 図書・ビデオ 地図・写真等	オリジナル/ コピー	発行機関	発行年
10	Six shallow wells and one deep boreholes sitting report for AWD Affected Kebeles, Kachabira, Sapera and Andagna Keranso in Merab and Mesrk Bedawacho Woredas	図書	コピー	Hadiya Zone Water Resources Development Office	2007.9
11	A Proposal for AWD Response	図書	コピー	South Nations Nationalities and People 's Regional State Water Resource Development Bureau	2007.8
12	Southern Nations, Nationalities and Peoples ' Regional State Regional Statistical Abstract 1999E.C/2006-2207	図書	コピー	Bureau of Finance and Economic Development	2007.6
13	International Rescue Committee Ethiopia Program Water, Sanitation and Hygiene in Mareko, Lanfro and Hulla Woredas, SNNPR	図書	コピー	International Rescue Committee Ethiopia	2007.10
14	International Rescue Committee Ethiopia Program Diarrheal Disease Prevention through Hygiene Behaviour Change and Safe Water in SNNPR	図書	コピー	International Rescue Committee Ethiopia	2008.12
15	Urban Water Supply Design Criteria (非公認資料)	図書	コピー	Ministry of Water Resources	2006.1
16	数量計算資料 (内部資料)	図書	コピー	Ethiopia Building Construction Authority	不明
17	Revised Humanitarian Requirements for 2008 (Government-Partners Joint Document)	図書	コピー	Disaster Management and Food Security Subsector, Ministry of Agriculture	2008.06
18	Humanitarian Requirement for Water, Sanitation and Hygiene Emergencies in 2008	図書	コピー	Emergency Water, Sanitation and Hygiene (WASH) Task Force	2008.02

番号	名称	形態 図書・ビデオ 地図・写真等	オリジナル/ コピー	発行機関	発行年
19	Emergency Water Supply Project Proposal for Drought affected and Border Woredas of Tigray Region	図書	コピー	Tigray Regional State Water Resource, Mines and Energy Bureau	2009.04
20	Emergency Water Supply Project Proposal for Drought affected, AWD affected and Flood prone area of the Region	図書	コピー	Amhara Water Resources Development Bureau	2009.05

A 7 . その他の資料・情報

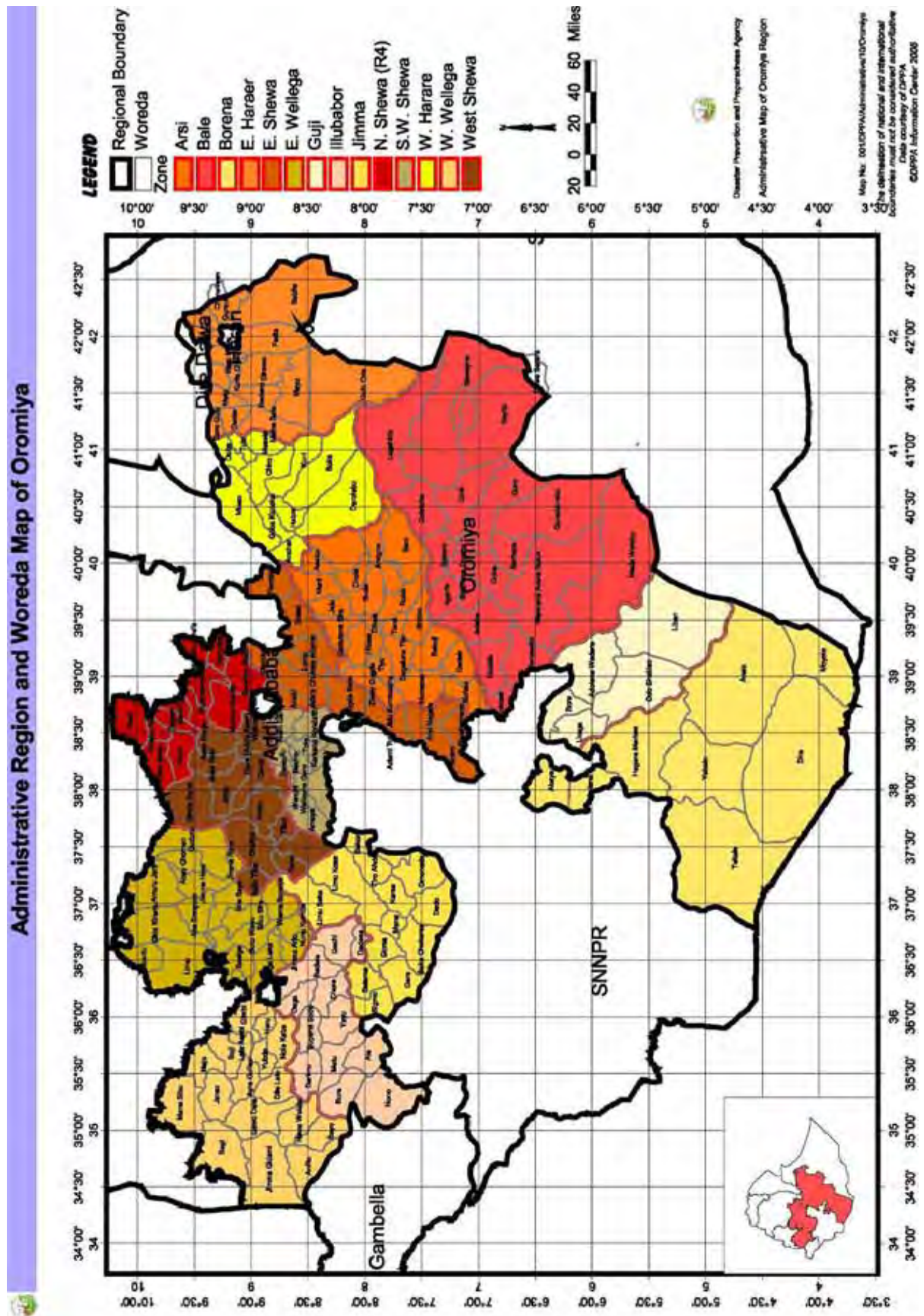
A 7. その他の資料・情報

- (1) 対象州地図

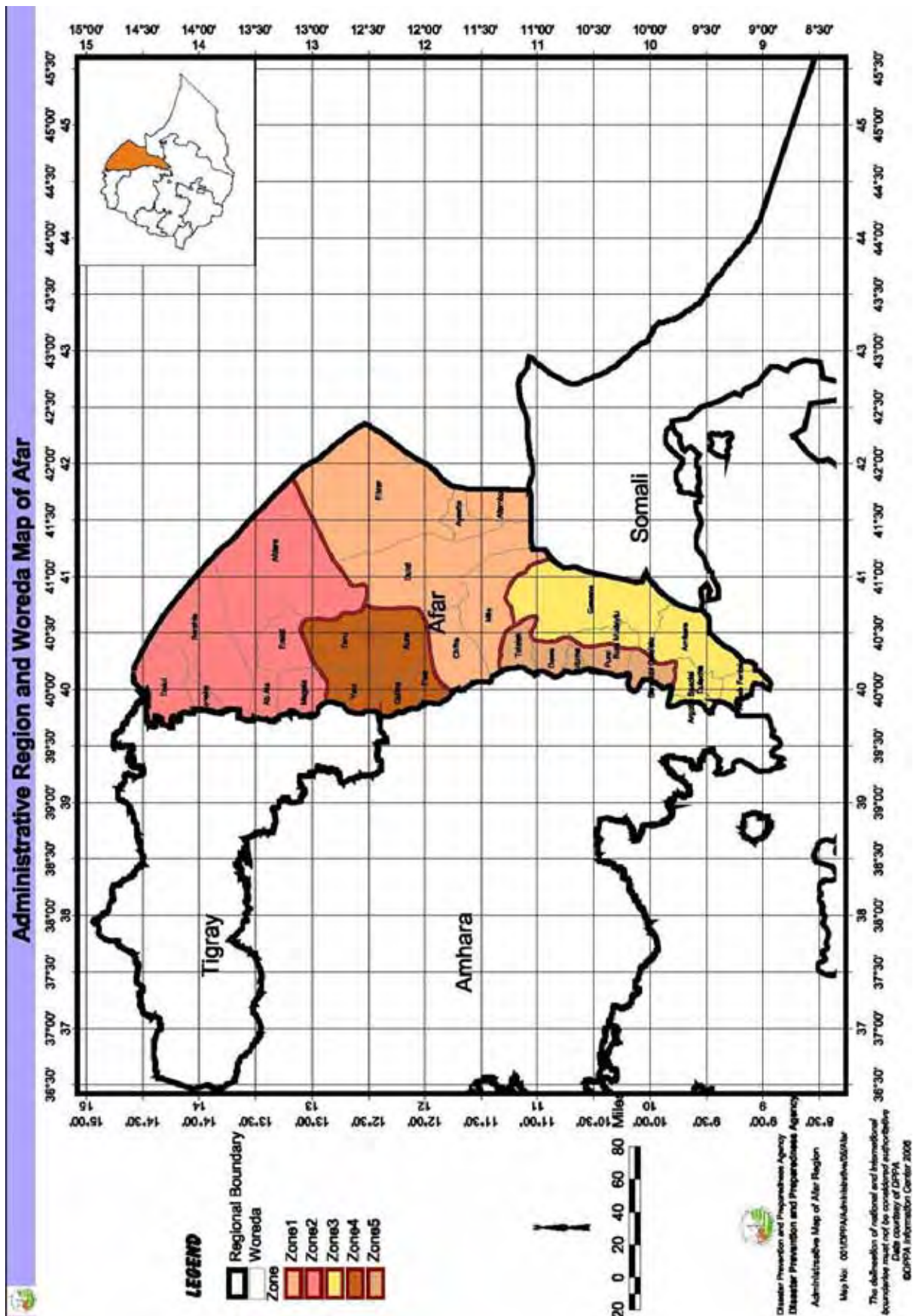
Administrative Region and Woreda Map of Tigray



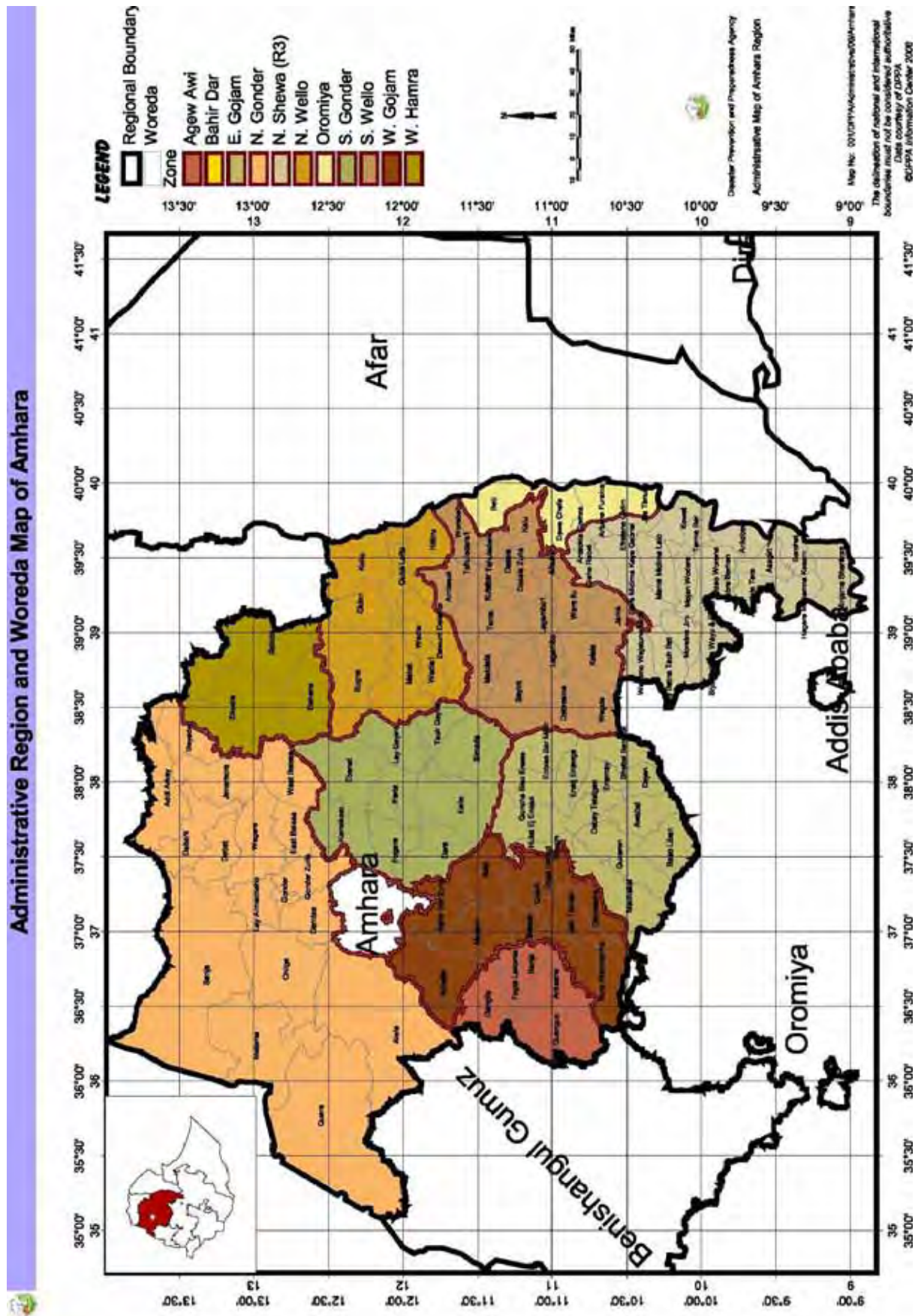
2) オロミア州



3) アファール州



4) アムハラ州





(2) 各州における NGO の活動状況

表 7.1 Tigray 州における給水事業支援状況 (2008 年)

ゾーン	ワレダ	サブセクター	機関
Central Tigray	Mereb Lehe	Other	NCA
Eastern Tigray	Gulomahda	New water schemes development	Cst joint office
Eastern Tigray	Gulomahda	Rehabilitation and maintenance of water schemes	Cst joint office
Eastern Tigray	Gulomahda	Training	Cst joint office
Eastern Tigray	Saesi Tsaedaem	New water schemes development	Cst joint office
Eastern Tigray	Saesi Tsaedaem	Rehabilitation and maintenance of water schemes	Cst joint office
Eastern Tigray	Saesi Tsaedaem	Training	Cst joint office
Eastern Tigray	Wukro	New water schemes development	ADRA
Eastern Tigray	Wukro	Other	NCA
Southern Tigray	Enderta	Rehabilitation and maintenance of water schemes	SC US
Southern Tigray	Alamata	New water schemes development	Oxfam us
Southern Tigray	Enderta	Other	SC US
Southern Tigray	Enderta	Rehabilitation and maintenance of water schemes	SC US
Southern Tigray	Hintalo Wajirat	Other	SC US
Southern Tigray	Hintalo Wajirat	Rehabilitation and maintenance of water schemes	SC US
Western Tigray	Tahtay Adiyabo	Other	IRC

表 7.2 Oromiya 州における給水事業支援状況 (2008 年)

ゾーン	ワレダ	サブセクター	機関
Arsi		Other	CARE
Bale	Ginir	New water schemes development	Merlin
Bale	Ginir	Rehabilitation and maintenance of water schemes	Merlin
Bale	Ginir	Training	Merlin
Bale	Gololcha	New water schemes development	Merlin
Bale	Gololcha	Rehabilitation and maintenance of water schemes	Merlin
Bale	Gololcha	Training	Merlin
Bale	Legehida	New water schemes development	Merlin
Bale	Legehida	Rehabilitation and maintenance of water schemes	Merlin
Bale	Legehida	Training	Merlin
Bale	Meda Welabu	Other	NCA
Bale	Rayitu	New water schemes development	Merlin
Bale	Rayitu	Rehabilitation and maintenance of water schemes	Merlin
Bale	Rayitu	Training	Merlin
Bale	Seweyna	New water schemes development	Merlin
Bale	Seweyna	Rehabilitation and maintenance of water schemes	Merlin
Bale	Seweyna	Training	Merlin
Bale		New water schemes development	Merlin
Bale		Rehabilitation and maintenance of water schemes	Merlin
Bale		Training	Merlin
Borena	Arero	New Water Schemes development	AFD
Borena	Dire	New Water Schemes development	AFD
Borena	Dire	New Water Schemes development	AFD
Borena	Dire	New Water Schemes development	AFD
Borena	Dire	Rehabilitation and maintenance of water schemes	AFD
Borena	Dire	Rehabilitation and maintenance of water schemes	AFD
Borena	Dire	Training	AFD
Borena	Dire	Training	AFD
Borena	Dugda Dawa	New Water Schemes development	AFD

ゾーン	ワレダ	サブセクター	機関
Borena	Dugda Dawa	New Water Schemes development	AFD
Borena	Dugda Dawa	Training	AFD
Borena	Dugda Dawa	Training	AFD
Borena		New water schemes development	NCA
Borena		Rehabilitation and maintenance of water schemes	Christian Aid
Borena		Rehabilitation and maintenance of water schemes	NCA
Borena		Water tankering	Christian Aid
Borena	Arero	Rehabilitation and maintenance of water schemes	AFD
Borena	Arero	Rehabilitation and maintenance of water schemes	SC US
Borena	Arero	Training	AFD
Borena	Bule Hora	New Water Schemes development	AFD
Borena	Bule Hora	Rehabilitation and maintenance of water schemes	AFD
Borena	Bule Hora	Training	AFD
Borena	Dire	Rehabilitation and maintenance of water schemes	CARE
Borena	Dire	Water Tankering	AFD
Borena	Dire	Water Tankering	CARE
Borena	Dugda Dawa	New water schemes development	Oxfam us
Borena	Dugda Dawa	Rehabilitation and maintenance of water schemes	AFD
Borena	Dugda Dawa	Rehabilitation and maintenance of water schemes	AFD
Borena	Miyo	New Water Schemes development	AFD
Borena	Miyo	New Water Schemes development	AFD
Borena	Miyo	Other	CARE
Borena	Miyo	Rehabilitation and maintenance of water schemes	AFD
Borena	Miyo	Rehabilitation and maintenance of water schemes	AFD
Borena	Miyo	Rehabilitation and maintenance of water schemes	AFD
Borena	Miyo	Rehabilitation and maintenance of water schemes	CARE
Borena	Miyo	Training	AFD
Borena	Miyo	Training	AFD
Borena	Miyo	Water New Water Schemes development	AFD
Borena	Miyo	Water Tankering	AFD
Borena	Moyale	Rehabilitation and maintenance of water schemes	CARE
Borena	Moyale	Rehabilitation and maintenance of water schemes	SC US
Borena	Moyale	Water Tankering	CARE
Borena	Teltele	New water schemes development	GOAL
Borena	Teltele	New water schemes development	GOAL
Borena	Teltele	New water schemes development	GOAL
Borena	Teltele	Other	GOAL
Borena	Teltele	Rehabilitation and maintenance of water schemes	CARE
Borena	Teltele	Training	GOAL
Borena	Yabelo	New Water Schemes development	AFD
Borena	Yabelo	New Water Schemes development	AFD
Borena	Yabelo	New water schemes development	GOAL
Borena	Yabelo	New water schemes development	GOAL
Borena	Yabelo	New water schemes development	GOAL
Borena	Yabelo	other	GOAL
Borena	Yabelo	Rehabilitation and maintenance of water schemes	AFD
Borena	Yabelo	Rehabilitation and maintenance of water schemes	AFD
Borena	Yabelo	Training	AFD
Borena	Yabelo	Training	GOAL
Borena	Yabelo	Water Tankering	CARE
East Harerge	Girawa	Other	CARE
East Harerge	Keresha	Rehabilitation and maintenance of water schemes	GOAL
East Harerge	Kombolchaa	Rehabilitation and maintenance of water schemes	GOAL
East Shewa	Adami Tulu Jido	Training	ADRA

ゾーン	ワレダ	サブセクター	機関
East Shewa	Arsi Negele	New Water Schemes development	ORDA
East Shewa	Arsi Negele	Rehabilitation and maintenance of water schemes	ORDA
East Shewa	Arsi Negele	Training	ORDA
Guji		New water schemes development	NCA
Guji	Liben	New water schemes development	COOPI
Guji	Liben	New water schemes development	COOPI
Guji	Liben	Other	COOPI
Guji	Liben	Rehabilitation and maintenance of water schemes	COOPI
Guji	Liben	Rehabilitation and maintenance of water schemes	COOPI
Guji	Liben	Rehabilitation and maintenance of water schemes	COOPI
Guji	Liben	Rehabilitation and maintenance of water schemes	SC US
South West	Shew	Rehabilitation and maintenance of water schemes	SC US
South West Shew	Becho	New water schemes development	Oxfam us
South West Shew	Walisona Goro	Other	SC US
South West Shew	Walisona Goro	Rehabilitation and maintenance of water schemes	SC US
West Arsi		New water schemes development	CCF
West Arsi		Other	ENF
West Arsi	Arsi Negele	New water schemes development	GAA
West Arsi	Arsi Negele	Rehabilitation and maintenance of water schemes	GAA
West Arsi	Arsi Negele	Training	GAA
West Arsi	Shala	New Water Schemes development	CDI
West Arsi	Shala	Training	CDI
West Arsi	Shala	Water Tankering	CDI
West Harerge	Kuni	New water schemes development	GOAL
West Harerge	Boke	new water schemes development	IRC
West Harerge	Boke	Rehabilitation and maintenance of water schemes	IRC
West Harerge	Boke	Training	IRC
West Harerge	Darolebu	New water schemes development	GOAL
West Harerge	Darolebu	Rehabilitation and maintenance of water schemes	GOAL
West Harerge	Darolebu	Rehabilitation and maintenance of water schemes	GOAL
West Harerge	Darolebu	Training	GOAL
West Harerge	Habro	Water Tankering	WVI
West Harerge	Kuni	Other	CARE
West Harerge	Kuni	Rehabilitation and maintenance of water schemes	GOAL
West Harerge	Kuni	Rehabilitation and maintenance of water schemes	GOAL
West Harerge	Kuni	Training	GOAL
West Harerge	Mieso	new water schemes development	IRC
West Harerge	Mieso	Rehabilitation and maintenance of water schemes	IRC
West Harerge	Mieso	Training	IRC
West Harerge	Tulo	Other	WVE
West Shewa	Bako Tibe	New water schemes development	GAA
West Shewa	Bako Tibe	Training	GAA
West Shewa		New Water Schemes development	ORDA
West Shewa		Training	ORDA
		Other	HCS

表 7.3 Afar 州における給水事業支援状況（2008 年）

ゾーン	ワレダ	サブセクター	機関
Zone 1	Chifra	Rehabilitation and maintenance of water schemes	GAA
Zone 1	Chifra	New water schemes development	ORDA
Zone 1	Chifra	New water schemes development	GAA
Zone 1	Chifra	Other	SC Norway
Zone 1	Chifra	Rehabilitation and maintenance of water schemes	ORDA

ゾーン	ワレダ	サブセクター	機関
Zone 1	Chifra	Training	ORDA
Zone 1	Chifra	Training	GAA
Zone 1	Chifra	Water Tankering	GAA
Zone 1	Dubti	Training	ORDA
Zone 1	Elidar	Training	ORDA
Zone 1	Elidar	Water Tankering	APD
Zone 1	Mile	New water schemes development	ORDA
Zone 1	Mile	New water schemes development	GAA
Zone 1	Mile	Rehabilitation and maintenance of water schemes	ORDA
Zone 1	Mile	Rehabilitation and maintenance of water schemes	ORDA
Zone 1	Mile	Rehabilitation and maintenance of water schemes	GAA
Zone 1	Mile	Training	ORDA
Zone 1	Mile	Training	GAA
Zone 1	Mile	Water Tankering	GAA
Zone 2		other	OXFAM
Zone 2		Water Tankering	OXFAM
Zone 4	Aura	Rehabilitation and maintenance of water schemes	SC US
Zone 4	Ewa	Water Tankering	IR
Zone 4		New water schemes development	GAA
Zone 4		Rehabilitation and maintenance of water schemes	GAA
Zone 4		Training	GAA
Zone 4		Water Tankering	GAA
Zone 4	Aura	Other	SC Norway
Zone 4	Aura	Other	SC US
Zone 4	Aura	Rehabilitation and maintenance of water schemes	SC US
Zone 4	Aura	Training	ORDA
Zone 4	Ewa	New Water Schemes development	IR
Zone 4	Ewa	Other	SC Norway
Zone 4	Ewa	Other	SC US
Zone 4	Ewa	Rehabilitation and maintenance of water schemes	IR
Zone 4	Ewa	Rehabilitation and maintenance of water schemes	SC US
Zone 4	Ewa	Rehabilitation and maintenance of water schemes	SC US
Zone 4	Ewa	Training	IR
Zone 4	Gulina	Other	SC Norway
Zone 4	Gulina	Other	SC US
Zone 4	Gulina	Rehabilitation and maintenance of water schemes	SC US
Zone 4	Gulina	Rehabilitation and maintenance of water schemes	SC US
Zone 4	Teru	Training	ORDA
Zone 4	Yalo	Other	SC US
Zone 4	Yalo	Other	SC Norway
Zone 4	Yalo	Rehabilitation and maintenance of water schemes	SC US
Zone 4	Yalo	Rehabilitation and maintenance of water schemes	SC US
Zone 5	Artuma	Other	SC Norway
Zone 5	Dewe	Other	SC Norway
Zone 5	Fursi	Other	SC Norway
Zone 5	Simurobi Gele'alo	New water schemes development	Farm Africa
Zone 5	Telalak	Other	SC Norway

表 7.4 Amhara 州における給水事業支援状況 (2008 年)

ゾーン	ワレダ	サブセクター	機関
North	Gonder	New water schemes development	GAA
North	Gonder	Rehabilitation and maintenance of water schemes	GAA
North	Gonder	Training	GAA

ゾーン	ワレダ	サブセクター	機関
North Gonder	Lay Armacheho	Other	NCA
North Wello		New water schemes development	GAA
North Wello		Rehabilitation and maintenance of water schemes	GAA
North Wello		Training	GAA
North Wello	Kobo	New Water Schemes development	ORDA
North Wello	Kobo	Rehabilitation and maintenance of water schemes	ORDA
North Wello	Kobo	Training	ORDA
South Gonder	Dera	Other	FHI
South Gonder	Esite	Other	CARE
South Gonder	Farta	Other	CARE
South Gonder	Kemekem	New water schemes development	Oxfam us
South Wello		New water schemes development	GAA
South Wello		Rehabilitation and maintenance of water schemes	GAA
South Wello		Training	GAA
South Wello	Ambasel	New Water Schemes development	ORDA
South Wello	Ambasel	Rehabilitation and maintenance of water schemes	ORDA
South Wello	Ambasel	Training	ORDA
South Wello	Debresina	New Water Schemes development	SC-UK
South Wello	Kutaber	New Water Schemes development	ORDA
South Wello	Kutaber	Rehabilitation and maintenance of water schemes	ORDA
South Wello	Kutaber	Training	ORDA
South Wello	Werebabu	New Water Schemes development	ORDA
South Wello	Werebabu	Rehabilitation and maintenance of water schemes	ORDA
South Wello	Werebabu	Training	ORDA
Wag Hamra	Dehana	Other	NCA
West Gojam	Bahir Dar Zuria	Other	FHI
West Gojam		Other	FHI
West Gojam	Achefer	Other	FHI

表 7.5 Somali 州 (Dire Dawa 含む) における給水事業支援状況 (2008 年)

ゾーン	ワレダ	サブセクター	機関
Afder	Bare	New water schemes development	GAA
Afder	Bare	Rehabilitation and maintenance of water schemes	GAA
Afder	Bare	Training	GAA
Afder	Chereti	New Water Schemes development	IR
Afder	Chereti	New Water Schemes development	IR
Afder	Chereti	Rehabilitation and maintenance of water schemes	IR
Afder	Chereti	Rehabilitation and maintenance of water schemes	IR
Afder	Chereti	Rehabilitation and maintenance of water schemes	OXFAM
Afder	Chereti	Training	IR
Afder	Chereti	Training	IR
Afder	Chereti	Water Tankering	IR
Afder	Chereti	Water Tankering	IR
Afder	Dolobay	Rehabilitation and maintenance of water schemes	SC US
Afder	Elkere	New Water Schemes development	IR
Afder	Elkere	Rehabilitation and maintenance of water schemes	IR
Afder	Elkere	Rehabilitation and maintenance of water schemes	SC US
Afder	Elkere	Training	IR
Afder	Elkere	Water Tankering	IR
Afder	Goro Baqaqsa	Rehabilitation and maintenance of water schemes	OXFAM
Afder	Goro Baqaqsa	Rehabilitation and maintenance of water schemes	SRS
Afder	Guradamole	Rehabilitation and maintenance of water schemes	OXFAM
Afder	Guradamole	Rehabilitation and maintenance of water schemes	SRS

ゾーン	ワレダ	サブセクター	機関
Afder	Hargele	New Water Schemes development	IR
Afder	Hargele	Rehabilitation and maintenance of water schemes	SC US
Afder	Hargele	Rehabilitation and maintenance of water schemes	IR
Afder	Hargele	Rehabilitation and maintenance of water schemes	OXFAM
Afder	Hargele	Training	IR
Afder	Hargele	Water Tankering	IR
Afder	Hargele	Water Tankering	SC US
Degehabur	Aware	New Water Schemes development	ORDA
Degehabur	Aware	New Water Schemes development	ORDA
Degehabur	Aware	New water schemes development	GAA
Degehabur	Aware	New water schemes development	GAA
Degehabur	Aware	Rehabilitation and maintenance of water schemes	ORDA
Degehabur	Aware	Rehabilitation and maintenance of water schemes	ORDA
Degehabur	Aware	Rehabilitation and maintenance of water schemes	GAA
Degehabur	Aware	Rehabilitation and maintenance of water schemes	GAA
Degehabur	Aware	Training	ORDA
Degehabur	Aware	Training	ORDA
Degehabur	Aware	Training	GAA
Degehabur	Aware	Training	GAA
Degehabur	Degehamedo	Other	MC
Degehabur	Misrak Gashamo	New Water Schemes development	ORDA
Degehabur	Misrak Gashamo	New water schemes development	GAA
Degehabur	Misrak Gashamo	Rehabilitation and maintenance of water schemes	ORDA
Degehabur	Misrak Gashamo	Rehabilitation and maintenance of water schemes	GAA
Degehabur	Misrak Gashamo	Training	ORDA
Degehabur	Misrak Gashamo	Training	GAA
Degehabur		Other	IRC
Degehabur		Other	IRC
Dire Dawa		Other	HCS
Fik		Rehabilitation and maintenance of water schemes	Concern
Fik		Water Tankering	SC-UK
Gode	Ferfer	New Water Schemes development	ORDA
Gode	Ferfer	New water schemes development	GAA
Gode	Ferfer	Rehabilitation and maintenance of water schemes	ORDA
Gode	Ferfer	Rehabilitation and maintenance of water schemes	GAA
Gode	Ferfer	Training	ORDA
Gode	Ferfer	Training	GAA
Gode	Gode	Rehabilitation and maintenance of water schemes	SC US
Gode	Gode	Water Tankering	CHF
Gode	Gode	Water Tankering	SC US
Gode	Gode	Water Tankering	SC US
Gode	Kelafo	New Water Schemes development	ORDA
Gode	Kelafo	New water schemes development	GAA
Gode	Kelafo	Other	CHF
Gode	Kelafo	Rehabilitation and maintenance of water schemes	ORDA
Gode	Kelafo	Rehabilitation and maintenance of water schemes	GAA
Gode	Kelafo	Training	ORDA
Gode	Kelafo	Training	CHF
Gode	Kelafo	Training	ADRA
Gode	Kelafo	Training	GAA
Gode	Kelafo	Water Tankering	CHF
Gode	Mustahil	Other	CHF
Gode	Mustahil	Training	CHF
Gode	Mustahil	Water Tankering	CHF

ゾーン	ワレダ	サブセクター	機関
Gode		New water schemes development	ADRA
Gode		New water schemes development	CHF
Gode		Other	CHF
Gode		Rehabilitation and maintenance of water schemes	ADRA
Gode		Rehabilitation and maintenance of water schemes	CHF
Gode		Training	CHF
Gode		Training	ADRA
Gode		Water tankering	ADRA
Jijiga	Hareshen	Water Tankering	OXFAM
Korahe	Debeweyin	New Water Schemes development	SP
Korahe	Debeweyin	Rehabilitation and maintenance of water schemes	SP
Korahe	Debeweyin	Training	SP
Korahe	Debeweyin	Training	SP
Korahe	Debeweyin	Water Tankering	SP
Korahe	Kebridehar	New Water Schemes development	SP
Korahe	Kebridehar	Rehabilitation and maintenance of water schemes	SP
Korahe	Kebridehar	Training	SP
Korahe	Kebridehar	Training	SP
Korahe	Kebridehar	Water Tankering	ACF
Korahe	Kebridehar	Water Tankering	SP
Korahe	Shekosh	New Water Schemes development	SP
Korahe	Shekosh	Rehabilitation and maintenance of water schemes	SP
Korahe	Shekosh	Training	SP
Korahe	Shekosh	Training	SP
Korahe	Shekosh	Water Tankering	SP
Korahe	Shilabo	Water Tankering Somali	ACF
Korahe		Other	IRC
Korahe		Rehabilitation and maintenance of water schemes	ACF
Korahe		Rehabilitation and maintenance of water schemes	ACF
Korahe		Rehabilitation and maintenance of water schemes	ACF
Liben	Dolo Odo	New water schemes development	COOPI
Liben	Dolo Odo	Rehabilitation and maintenance of water schemes	CCM
Liben	Dolo Odo	Rehabilitation and maintenance of water schemes	COOPI
Liben	Dolo Odo	Rehabilitation and maintenance of water schemes	SC US
Liben	Dolo Odo	Training	CCM
Liben	Dolo Odo	Training	COOPI
Liben	Dolo Odo	Water Tankering	CCM
Liben	Filtu	New water schemes development	COOPI
Liben	Filtu	Rehabilitation and maintenance of water schemes	CCM
Liben	Filtu	Rehabilitation and maintenance of water schemes	COOPI
Liben	Filtu	Rehabilitation and maintenance of water schemes	SC US
Liben	Filtu	Training	CCM
Liben	Filtu	Training	COOPI
Liben	Filtu	Water Tankering	CCM
Liben	Hudat	New water schemes development	COOPI
Liben	Hudat	New water schemes development	NCA
Liben	Hudat	Rehabilitation and maintenance of water schemes	COOPI
Liben	Hudat	Rehabilitation and maintenance of water schemes	SC US
Liben	Hudat	Training	COOPI
Liben	Moyale	New water schemes development	COOPI
Liben	Moyale	Rehabilitation and maintenance of water schemes	COOPI
Liben	Moyale	Rehabilitation and maintenance of water schemes	SC US
Liben	Moyale	Training	COOPI
Liben		New water schemes development	COOPI

ゾーン	ワレダ	サブセクター	機関
Liben		New water schemes development	NCA
Liben		Rehabilitation and maintenance of water schemes	COOPI
Liben		Training	COOPI
Liben		Water Tankering	SC US
Warder		Rehabilitation and maintenance of water schemes	ACF
Warder		Rehabilitation and maintenance of water schemes	ACF
Warder	Warder	Water Tankering	ACF
		Rehabilitation and maintenance of water schemes	ZRC
		Rehabilitation and maintenance of water schemes	ZRC
		Rehabilitation and maintenance of water schemes	ZRC
		Water Tankering	ZRC

表 7.6 南部諸民族州における給水事業支援状況（2008 年）

ゾーン	ワレダ	サブセクター	機関
Amaro SW	Amaro	Other	NCA
Gurage		Water tankering	ADRA
Gurage	Sodo	New water schemes development	GAA
Gurage	Sodo	Rehabilitation and maintenance of water schemes	GAA
Gurage	Sodo	Training	GAA
Selti		New Water Schemes development	ORDA
Selti		Rehabilitation and maintenance of water schemes	ORDA
Selti		Training	ORDA
Sidama	Hulla	Rehabilitation and maintenance of water schemes	IRC
Sidama	Hulla	Water tankering	IRC
Sidama	Aroresa	New water schemes development	IRC
Sidama	Aroresa	Rehabilitation and maintenance of water schemes	IRC
Sidama	Aroresa	Water tankering	IRC
Sidama	Boricha	Rehabilitation and maintenance of water schemes	GOAL
Sidama	Dara	New water schemes development	IRC
Sidama	Dara	Rehabilitation and maintenance of water schemes	IRC
Sidama	Dara	Water tankering	IRC
Sidama	Hulla	New water schemes development	IRC
Sidama	Shebedino	Rehabilitation and maintenance of water schemes	GOAL
South Omo		New Water Schemes development	AFD
South Omo		Rehabilitation and maintenance of water schemes	AFD
South Omo		Training	AFD
South Omo	Hamer	New water schemes development	Farm Africa
Wolayita	Damot Weyde	Rehabilitation and maintenance of water schemes	GOAL
Wolayita	Damot Gale	Rehabilitation and maintenance of water schemes	GOAL
		Rehabilitation and maintenance of water schemes	SP
		Training	SP

(3) ベースライン調査結果

1) 乳児・幼児死亡率（州別）

表 7.7 乳児・幼児死亡率

Region	Neonatal mortality (in 1,000)	Under-five mortality (in 1,000)
	(age<1mo.)	(1mo<age<5yr)
Tigray	40	66
Affar	33	90
Amhara	50	104
Oromiya	40	82
Somali	27	66
SNNP	36	106

Source: "Ethiopia Demographic and Health Survey 2005",
Central Statistical Agency, Addis Ababa, Ethiopia (Sep. 2006),
ORC Macro Calverton, Maryland, USA

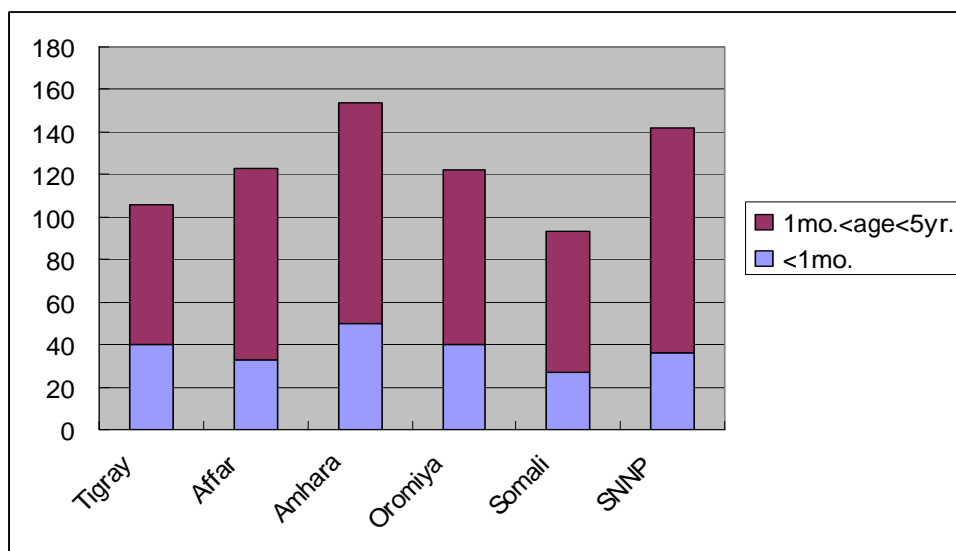


図 7.1 州別乳児・幼児死亡者数

2) 水源の形態

表 7.8 地域別の飲料水水源の形態比（世帯）

Region	Rural Area				Urban Area			
	Own Tap	Well, Spring	Public Tap (bono)	Others	Own Tap	Well, Spring	Public Tap (bono)	Others
Tigray	1	23	19	57	23	6	68	3
Afar	1	6	20	73	17	1	60	22
Amhara	1	14	5	80	20	4	69	8
Oromiya	1	12	11	76	18	5	67	9

Region	Rural Area				Urban Area			
	Own Tap	Well, Spring	Public Tap (bono)	Others	Own Tap	Well, Spring	Public Tap (bono)	Others
Somali	0	8	13	79	8	4	65	23
SNNPR	1	16	13	70	17	8	59	16

Source: "Ethiopia Demographic and Health Survey 2005", Central Statistical Agency, Addis Ababa, Ethiopia (Sep. 2006), ORC Macro Calverton, Maryland, USA

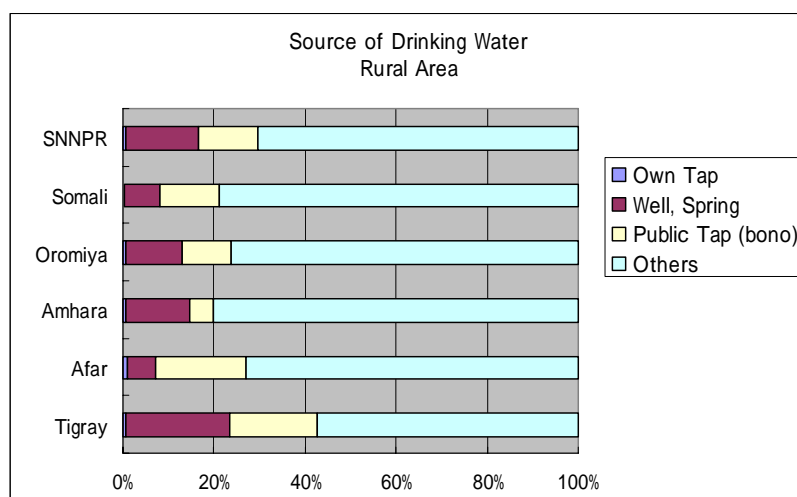


図 7.2 給水元 (地方部)

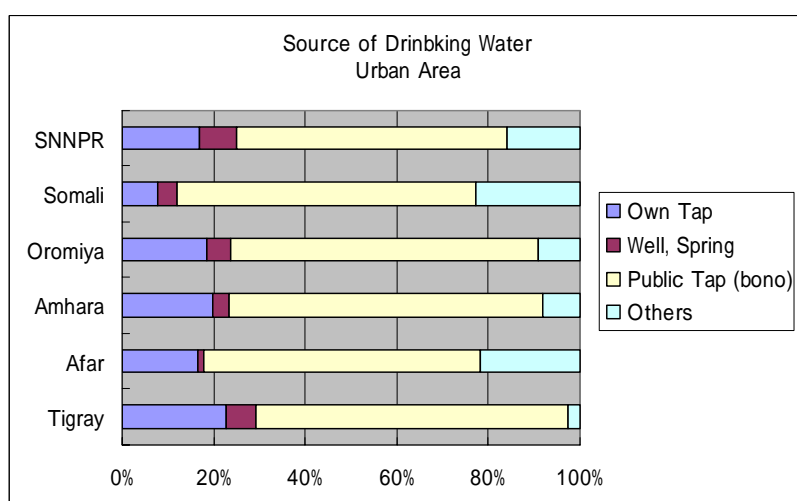


図 7.3 給水元 (都市部)

3) 州別の水因性疾患罹患率

表 7.9 TIGRAY

Rank	Diagnosis	No. of all Cases
1	Acute upper Respiratory Infection	89,535
2	Unspecified Malaria	75,680

Rank	Diagnosis	No. of all Cases
3	Intestinal Parasites others	44,281
4	Gastritis and Duodenitis	36,715
5	Skin Infection	35,797
6	Other Helminthes	35,495
7	Amoebiasis	23,522
8	Eye Infection	21,556
9	Bronchopneumonia	21,096
10	Accidents	21,030
Total of Leading Diseases		404,707

表 7.10 OROMIA

Rank	Diagnosis	No. of all Cases
1	Acute Upper Respiratory	113,058
2	Otitis media and mastoiditis	97,598
3	Gastritis and Duodenitis	88,442
4	Homicide and Injury Purposely Inflicted by other person	86,129
5	Other Helminthes	82,097
6	Bronchopneumonia	70,055
7	All other Diseases of Genito-Urinary System	62,344
8	Primary a typical other and unspecified pneumonia	56,642
9	Other Unspecified Malaria	54,513
10	Infection of Skin and Subcutaneous tissue	53,113
Total of Leading Diseases		763,991
Total of other Diseases		341,658
Total Causes		1,105,649

表 7.11 AFAR

Rank	Diagnosis	No. of all Cases
1	Malaria	113,145
2	Acute upper Respiratory Infection	9,771
3	All other Infective and parasitic Diseases	5,171
4	All other Respiratory Disease	4,219
5	Gastro enteritis and colitis	4,167
6	Other helminthes	3,444
7	Infection of skin and subcutaneous tissue	3,247
8	Otitis media and mastoiditis	2,915
9	Amoebiasis	2,634
10	Unspecified Pneumonia	2,461
Total of Leading Diseases		151,174
Total of other Diseases		48,550
Total Causes of Morbidity		199,724

表 7.12 AMHARA

Rank	Diagnosis	No. of all Cases
1	All forms of Malaria	169,229
2	Pneumonia	100,389
3	Intestinal Parasites	94,991
4	All other Respiratory Diseases	71,082
5	Skin Infection	64,230
6	Diarrhea	48,880

Rank	Diagnosis	No. of all Cases
7	Gastritis	47,502
8	Rheumatism	45,129
9	Eye diseases	43,009
10	URI	38,166
Total -of Leading Diseases		722,607
Total -of other Diseases		182,592
Total Causes of Morbidity		905,199

表 7.1 3 SOMALI

Rank	Diagnosis	No. of all Cases
	A.U.R.I(Acute Upper Respiratory tract	
1	Infection	62,696
2	All form of pneumonia	56,589
3	All forms of Malaria	50,058
4	Gastro-enteritis	39,468
5	Anemia	31,676
6	G.U.T.I.(Genitourinary Tract Infection)	24,936
7	Gastritis	24,542
8	Dysentery	23,568
9	Intestinal Parasites	10,744
10	Skin Diseases	10,688
Total of Leading Diseases		334,965

表 7.1 4 SNNP

Rank	Diagnosis	No. of all Cases
1	Malaria All Types	690,991
2	Pneumonia	277,732
3	Helimentiosys (Excluding Guinea Worm 042.3)	226,748
4	TB All Types	186,827
5	Upper Respiratory Infection	165,429
6	Accident	131,269
7	Gastritis and Duodenities	130,570
8	All other diseases of genito-urinary system	88,370
9	Infection of skin and subcutaneous Tissue	88,007
10	Typhoid	77,001
Total of leading diseases		2,062,944
Total of other diseases		568,709
Total causes of Morbidity		2,631,653

出典：Federal Ministry of Health (2000)

4) 指標の設定

世界保健機関(WHO: World Health Organization)の統計データ等から算出した 2009 年、および 2011 年の「エ」国の五歳未満の急性下痢症 (AWD: Acute Watery Diarrhoea、コレラを含む) による推定幼児死亡者数は以下のとおりである。

表 7.15 5歳以下の幼児の急性下痢症による死亡者数予測

	ティグライ州	アファール州	アムハラ州	オロミア州	ソマリ州	南部諸民族州
2009	16,198	3,688	59,082	115,163	11,540	60,674
2011	16,693	3,781	59,939	119,559	11,908	62,989

出典：世界保健統計 2008 (WHO)、世界保健統計 2009 (WHO)、2007 年人口統計要覧、エチオピア人口統計委員会

本調査の効果を計る指標として「急性下痢症による 5 歳未満の幼児死亡率 / 原因」とした。5 歳以下の死亡率（幼児死亡率）に注目する理由は、抵抗力が弱い幼児が最も給水環境等に影響されやすく、地域の給水事情を含む住環境の水準を示す一般的な指標として定着しているためである。一方、1 歳以下の死亡率（乳児死亡率）を採用しない理由は、出産環境や食事（母乳）等、他の要因が乳児死亡率に影響する可能性が大きいため、一般住民の環境指標とはなりにくいと考えられるためである

表 7.16 2009 年における各州の幼児死亡率

州 名	2009 年				
	人口 (A)	幼児人口 (B)	幼児の人口に占める割合 (C) = (A) × (B)	急性下痢症による幼児の死亡者数 (D)	急性下痢症による幼児人口に対する幼児の死亡率 (E) = (D) / (B)
ティグライ州	4,495,716	656,375	14.60%	16,198	2.47%
アファール州	1,465,018	149,432	10.20%	3,688	2.47%
アムハラ州	17,734,019	2,394,093	13.50%	59,082	2.47%
オロミア州	28,454,770	4,666,582	16.40%	115,163	2.47%
ソマリ州	4,630,014	467,631	10.10%	11,540	2.47%
南部諸民族州	15,760,301	2,458,607	15.60%	60,674	2.47%
合計	72,539,837	10,792,720	14.88%	266,346	2.47%

幼児：5 歳未満の住民

表 7.17 2011 年における各州の幼児死亡率予想

州 名	2011 年推定				
	人口 (A)	幼児人口 (B)	幼児の人口に占める割合 (C) = (A) × (B)	急性下痢症による幼児の死亡者数 (D)	急性下痢症による幼児人口に対する幼児死亡率 (E) = (D) / (B)
ティグライ州	4,676,976	682,838	14.60%	16,559	2.43%
アファール州	1,518,944	154,932	10.20%	3,757	2.43%
アムハラ州	18,253,982	2,464,288	13.50%	59,760	2.43%
オロミア州	29,751,070	4,879,175	16.40%	118,321	2.43%
ソマリ州	4,820,880	486,909	10.10%	11,808	2.43%
南部諸民族州	16,478,070	2,570,579	15.60%	62,337	2.43%
合計	75,499,922	11,238,722	14.89%	272,542	2.43%

表 7.18 プロジェクト効果

州 名	プロジェクトによる貢献度				全体	
	プロジェクト裨益人口 (F)	裨益人口中の幼児数 (G)=(F)×(C)	急性下痢症による幼児人口に対する幼児死亡率 (E)	急性下痢症による死亡の危険が回避されると推定される幼児数 (H)=(G)×(E)	急性下痢症による幼児の死亡者数 (I)=(D)-(H)	急性下痢症による幼児人口に対する幼児死亡率 (J)=(I)/(B)
ティグライ州	291,757	42,597	2.43%	1,033	15,526	2.27%
アファール州	180,933	18,455	2.43%	448	3,310	2.14%
アムハラ州	690,798	93,258	2.43%	2,262	57,498	2.33%
オロミア州	229,500	37,638	2.43%	913	117,409	2.41%
ソマリ州	1,032,046	104,237	2.43%	2,528	9,280	1.91%
南部諸民族州	492,801	76,877	2.43%	1,864	60,473	2.35%
合計	2,917,835	373,061	2.43%	9,047	263,495	2.34%

(4) 南部諸民族州社会状況調査結果

表 7.19 社会状況調査結果 (ブタジラ村)

Woreda	Meskan	Mareko
Name of Village/ Town	Inceno Town	Bida Faka Kebele
<i>Questions for the government</i>		
1. Number of beneficiary targeted households	2,500	540
2. Number of expected beneficiary population	15,000 (within the town) 27,000 (outside of the town) 42,000 (total)	2,704
3. Ethnic group	Guragha (90%) Mareko (6%) Amhara (3%)	Mareko (90%) Oromo (10%)
4. Religion	Muslim (90%) Orthodox protestant (8%) Others (2%)	Muslim (Over 90%)
5. Management body of water	5 Water committees	1 VWC (7members)
<i>Questions for head of Household (H/H)</i>		
<i>2. Economic aspect</i>		
- Occupation	Farmers 59%, Merchants 29%, Others 35%	Farmer 100%
- Average annual income	8200 Birr	3972 Birr
<i>3. Water supply aspect</i>		
- Major source	Deep Well 57%, Hand Dug Well 43%	Deep Well 100%
- Average time to reach the water source /single trip/	14 minutes/trip (5.5 times)	5.8 hours (1.7 times)
- Major problem related to water supply	Deep well: Distance Hand dug well: Water quality	Time consuming, High water tariff

Woreda	Meskan	Mareko
- Average water payment rate	1.5 cents(/25 liter)	35 Birr (25/liter)
- Average consumption rate of water	170 liter/day	283 liter/day
<i>4. Health and sanitation</i>		
- Common disease	Malaria, Diarrhea	Malaria, Ambeba, Fluoride Poisoning
Date of survey:	May 6 th , 2009	May 7 th , 2009
Government Representative	Mr. Awol Hamza Head of Woreda Resources Development Office Tel: 0916 839746	Mr. Fanthun Mitiku Head of Wareda Water Resources Development Office Tel: 0913 719557
Cooperated official in the field	Mr. Jemar Mohammed Tel: 0916 839015	Mr. Ashenafi Ketro

Note: Prevailing fluoride poisoning in Bida Faka village is conspicuous. Some villagers are developing liver problems, suspiciously, due to the fluoride contaminated water, and almost all villagers have teeth decay.

DRILLING RIG OPERATION AND MAINTENANCE RECORD (For Photo Frame)

Please attach photos to show the current condition*Month**

OBLIQUE VIEW (Drilling rig)

OBLIQUE VIEW (Associated Vehicle and Tools)

VEHICLE OPERATION AND MAINTENANCE RECORD (For Photo Frame)**Please attach photos to show the current condition***Month**

OBLIQUE FRONT VIEW

OBLIQUE REAR VIEW

EQUIPMENT OPERATION AND MAINTENANCE RECORD (For Photo Frame)

Please attach photos to show the current condition*Month**

OBLIQUE FRONT VIEW

OBLIQUE REAR VIEW

<Annual Record Format>

EQUIPMENT CONDITION RECORD

Name of Organization:

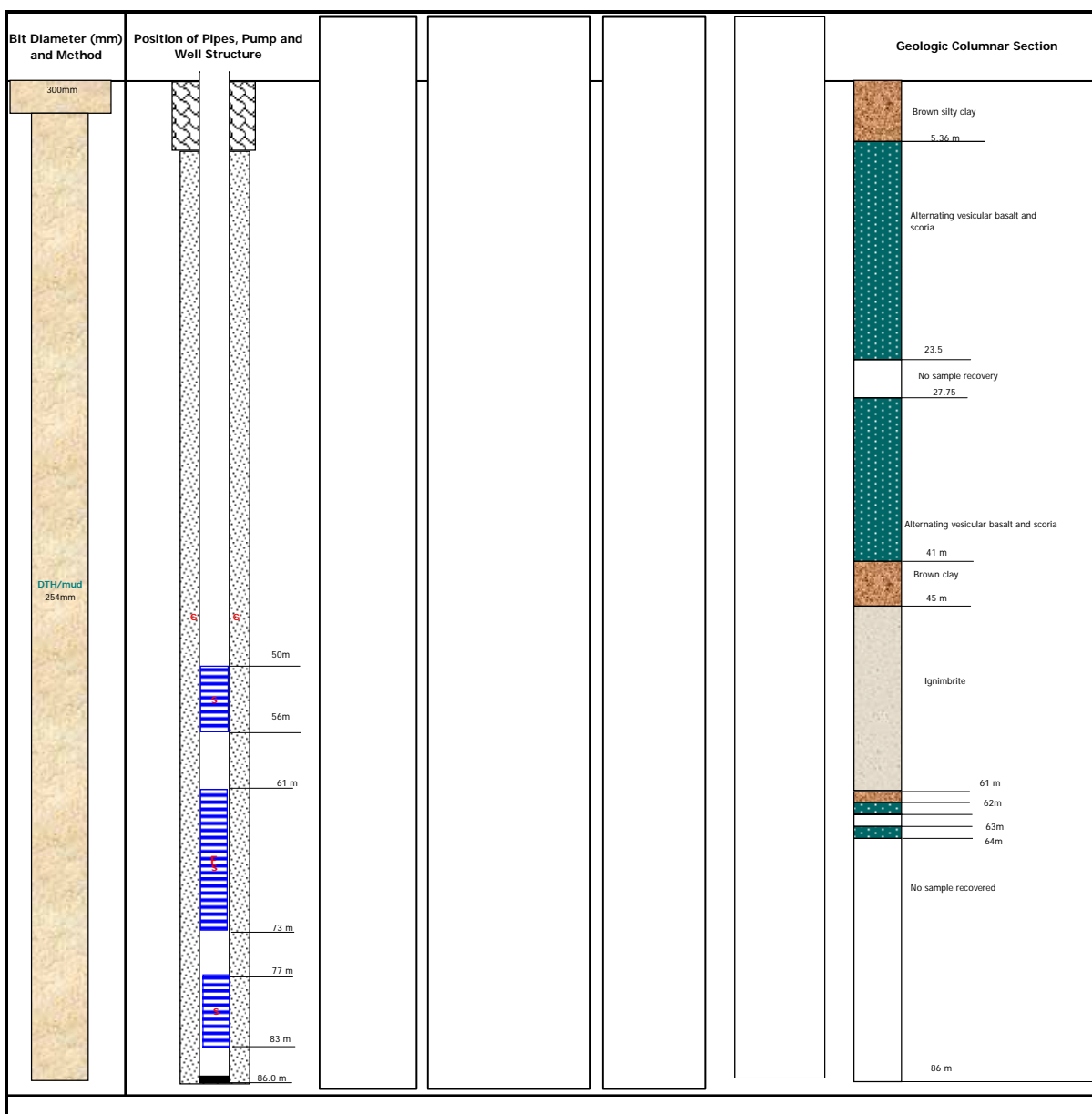
Date: _____

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(6) 既存井戸プロフィール (南部諸民族州)

WELL LOG (Semen Shershera test well)

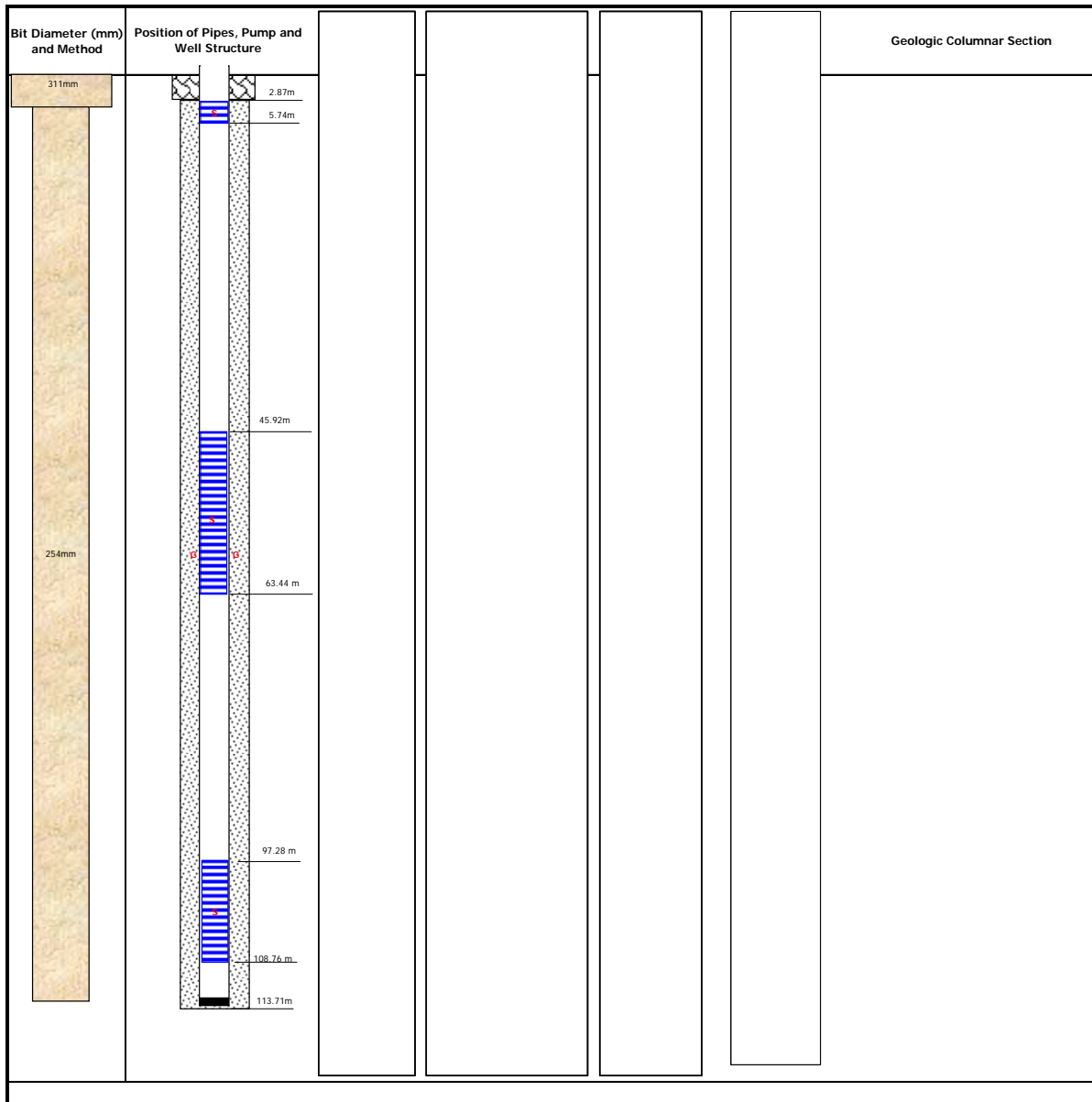
Well No.	Location	Coordination		Altitude	Town	Wareda	State	Cuntry
BZDP/TW2	Semen Shershera	436926 E.	899128N	1981mamsl		Meskan	SNWPR	
Date: from to	Drilling :	Equipment Type	Method	Flow	Depth	Depth	Depth	Final Deth (m)
			Rotation	DTH/Mud				86
Casing type :		Type	Inside Dia.	Outside Dia.	Joint Type	Position of blind casing:		Total Length
(pvc)		STPG 6" x 5.5m	151.0mm	165.2mm	Screw	+0.5-50:		56-61 73-77 83 - 86
Screen Pipe :		Material	Diameter	Silt Size	Open Rate	Joint Type	Position of screen	
		SUS304	150.0mm	1.0mm	20%	Screw	50 - 56, 61-73, 77-83	
Gravel Pakking		Origen	Gravel Size	Location	Volume	Development :		Discharge
			ø 2-6mm			Static Water Level		345.6m ³ /day(4l/s)
						GL -48.6m		
Submergible pump :		Installation Date :		Position :		Drawdown		21.6m
						Duration		



Source: 「Butajira-Ziway Areas Development Study Drilling and Pumping Test, January 2008」

WELL LOG (Inceno test well)

Well No.	Location		Coordination		Altitude	Town	Wareda	State	Cuntry	
	Inceno		441844 E	890844N	1847mamsl		Meskan	SNNPR		
Date: from to		Drilling :	Equipment Type	Method	Flow	Depth	Depth	Depth	Final Deth (m)	
									113.7	
Casing type :	Type	Inside Dia.	Outside Dia.	Joint Type	Position of blind casing:				Total Length	
					+0.7-2.87	5.74-45.92	63.14-97.28	108.76-111.5		
Screen Pipe :	Material	Diameter	Silt Size	Open Rate	Joint Type	Position of screen				Total Length
						2.87-5.74	45.92-63.14	97.28-108.76		
Gravel Pakking	Origen	Gravel Size	Location	Volume	Development :	Static Water Level	Drawdown	Duration	Discharge	
						GL -14.9m	4.95		630m3/day (7.73l/s)	
Submergible pump :		Installation Date :		Position :						



Data Source: by Ethiopia Water Technology Center Drilling Crew

(7) 配水計算結果 (南部諸民族州)

PointData

Node	Hydraulic head (m)	Elevation (m)	Effective water head (m)	Flow (l/s)	Remark
tank	2051.450	2,048.60	2.850	-1.380	
1	2050.332	2,045.26	5.072	0.000	
2	2049.140	2,038.48	10.660	0.000	
3	2018.618	1,992.72	25.898	0.000	
4	2000.710	1,996.73	3.980	0.000	
5	1996.681	1,957.77	38.911	0.000	
6	1989.550	1,959.59	29.960	0.000	
7	1982.429	1,958.04	24.389	0.000	
8	1970.913	1,950.55	20.363	0.000	
NIP1	2050.139	2,045.26	4.879	0.138	
NIP2	2047.277	2,039.00	8.277	0.138	
NIP3	2018.530	1,992.72	25.810	0.138	
EWP1	2000.630	1,967.81	32.820	0.138	
EWP2	1996.593	1,957.76	38.833	0.138	
NIP4	1993.833	1,956.40	37.433	0.138	
EWP3	1989.462	1,959.59	29.872	0.138	
NIP5	1982.341	1,958.04	24.301	0.138	
NIP6	1970.684	1,950.55	20.134	0.138	
NIP7	1967.679	1,945.50	22.179	0.138	

LineData

ST	EN	Pipe size (mm)	Type of pipe	Pipe length (m)	C-value	Flow (l/s)	Velocity (m/s)	Hydraulic gradient (‰)	Head loss (m)
tank	1	46	HDPE	54.000	130	1.380	0.820	20.697	1.118
1	2	46	HDPE	70.000	130	1.242	0.738	17.029	1.192
1	NIP1	23	HDPE	22.000	130	0.138	0.332	8.784	0.193
2	3	37	HDPE	748.000	130	1.104	1.027	40.805	30.522
2	NIP2	23	HDPE	212.000	130	0.138	0.332	8.788	1.863
3	NIP3	23	HDPE	10.000	130	0.138	0.332	8.784	0.088
3	4	37	HDPE	562.000	130	0.966	0.899	31.864	17.908
4	EWP1	40	GI	83.000	100	0.138	0.110	0.965	0.080
4	5	30	HDPE	434.000	130	0.276	0.401	9.285	4.030
5	EWP2	23	HDPE	10.000	130	0.138	0.332	8.788	0.088
5	NIP4	23	HDPE	324.000	130	0.138	0.332	8.789	2.848
4	6	30	HDPE	333.000	130	0.552	0.803	33.515	11.161
6	EWP3	23	HDPE	10.000	130	0.138	0.332	8.784	0.088
6	7	30	HDPE	362.000	130	0.414	0.602	19.672	7.121
7	NIP5	23	HDPE	10.000	130	0.138	0.332	8.784	0.088
7	8	23	HDPE	363.000	130	0.276	0.665	31.724	11.516
8	NIP6	23	HDPE	26.000	130	0.138	0.332	8.784	0.228
8	NIP7	23	HDPE	368.000	130	0.138	0.332	8.789	3.234

Hydraulic Analysis (Distribution network for Inceno)

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Node	Hydraulic head (m)	Elevation (m)	Effective water head (m)	Flow (l/s)	Remark
Tank	1,851.25	1,839.05	12.200	-6.871	
1	1,850.81	1,838.93	11.880	0.000	
2	1,850.71	1,838.78	11.934	0.000	
3	1,848.62	1,837.39	11.230	0.000	
4	1,846.61	1,835.68	10.935	0.000	
5	1,849.85	1,838.85	10.998	0.000	
6	1,848.86	1,837.92	10.940	0.000	
7	1,847.24	1,837.40	9.842	0.000	
8	1,846.62	1,837.14	9.475	0.000	
9	1,847.89	1,838.71	9.175	0.000	
10	1,846.78	1,838.97	7.812	0.000	
11	1,848.01	1,837.82	10.193	0.000	
12	1,846.49	1,837.70	8.794	0.000	
13	1,845.27	1,837.77	7.495	0.000	
14	1,847.85	1,837.85	9.997	0.000	
15	1,845.82	1,837.65	8.171	0.000	
16	1,844.19	1,836.60	7.593	0.000	
17	1,841.82	1,836.60	5.219	0.000	
EWP1	1,839.75	1,838.71	1.035	0.389	
EWP2	1,847.15	1,837.20	9.953	0.259	
EWP3	1,849.48	1,838.70	10.777	0.259	
EWP4	1,847.66	1,838.71	8.946	0.259	
EWP5	1,847.28	1,837.88	9.400	0.259	
EWP6	1,839.62	1,836.78	2.837	0.389	
PWP1	1,842.57	1,835.60	6.966	0.389	
PWP2	1,843.79	1,836.95	6.839	0.389	
PWP3	1,847.30	1,838.09	9.210	0.389	
PWP4	1,844.78	1,832.53	12.248	0.389	
PWP5	1,845.12	1,831.95	13.165	0.389	
PWP6	1,844.69	1,838.05	6.641	0.389	
PWP7	1,844.33	1,836.59	7.744	0.389	
PWP8	1,843.94	1,836.80	7.145	0.389	
PWP9	1,842.09	1,836.40	5.688	0.389	
PWP10	1,841.06	1,835.45	5.612	0.389	
PWP11	1,840.23	1,834.60	5.628	0.389	
PWP12	1,840.55	1,835.90	4.653	0.389	
PWP13	1,842.40	1,835.70	6.697	0.389	

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ST	EN	Pipe size (mm)	Type of pipe	Pipe length (m)	C-value	Flow (l/s)	Velocity (m/s)	Hydraulic gradient (%)	Head loss (m)
89	1	83.3	HDPE	19	130	6.871	1.261	23.156	0.440
1	2	50.0	GI	9	100	0.907	0.462	10.635	0.096
2	EWP3	23.0	GI	27	100	0.259	0.624	45.840	1.238
2	3	50.0	GI	367	100	0.648	0.330	5.706	2.094
3	EWP2	23.0	GI	32	100	0.259	0.624	45.840	1.467
3	4	40.0	GI	305	100	0.389	0.310	6.575	2.005
4	PWP1	29.6	HDPE	231	130	0.389	0.566	17.528	4.049
1	5	83.3	HDPE	54	130	5.964	1.095	17.814	0.962
5	6	58.3	HDPE	200	130	1.167	0.437	4.939	0.988
6	PWP3	29.6	HDPE	89	130	0.389	0.566	17.529	1.560
6	7	46.3	HDPE	226	130	0.778	0.462	7.161	1.618
7	EWP1	23.0	GI	77	100	0.389	0.937	97.360	7.497
7	8	37.0	HDPE	106	130	0.389	0.362	5.913	0.627
8	PWP2	37.0	HDPE	478	130	0.389	0.362	5.912	2.826
5	9	46.3	HDPE	161	130	1.037	0.616	12.192	1.963
9	EWP4	23.0	GI	5	100	0.259	0.624	45.817	0.229
9	10	46.3	HDPE	154	130	0.778	0.462	7.161	1.103
10	PWP4	37.0	HDPE	339	130	0.389	0.362	5.913	2.004
10	PWP5	37.0	HDPE	282	130	0.389	0.362	5.913	1.667
5	11	83.3	HDPE	242	130	3.760	0.690	7.582	1.835
11	EWP5	23.0	GI	16	100	0.259	0.624	45.840	0.733
11	12	40.0	GI	64	100	0.778	0.619	23.732	1.519
12	13	40.0	GI	187	100	0.389	0.310	6.575	1.229
13	PWP6	37.0	HDPE	97	130	0.389	0.362	5.913	0.574
12	PWP7	46.3	HDPE	1,089	130	0.389	0.231	1.984	2.160
11	14	50.0	GI	75	100	0.389	0.198	2.218	0.166
14	PWP8	37.0	HDPE	660	130	0.389	0.362	5.913	3.902
11	15	58.3	HDPE	123	130	2.334	0.875	17.826	2.193
15	16	58.3	HDPE	128	130	1.945	0.729	12.718	1.628
16	EWP6	23.0	GI	47	100	0.389	0.937	97.357	4.576
16	PWP9	37.0	HDPE	356	130	0.389	0.362	5.912	2.105
16	17	58.3	HDPE	481	130	1.167	0.437	4.936	2.374
17	PWP10	37.0	HDPE	128	130	0.389	0.362	5.913	0.757
17	PWP11	37.0	HDPE	269	130	0.389	0.362	5.913	1.591
17	PWP12	37.0	HDPE	214	130	0.389	0.362	5.913	1.265
15	PWP13	37.0	HDPE	579	130	0.389	0.362	5.913	3.423